MARCH, 1941

# ELECTRICAL SOUTH

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*HUNTER—in its 54th year of exclusive fan making—is now equipping many buildings of old and new customers with its latest Zephair Cooling Systems.*

*Careful hotel and store operators of long experience rely upon HUNTER engineers for scientific and economical solution of their ventilating problems.*

HUNTER FAN & VENTILATING COMPANY, INC.

*Factory:* FULTON, N. Y.

*General Sales Offices:* Memphis, Sterick Bldg.

*Eastern Sales Office:* New York, 92 Warren Street

*Sales Offices:*

ATLANTA, LOS ANGELES, BOSTON, CHICAGO, NEW ORLEANS, CLEVELAND, DALLAS, PHILADELPHIA, ST. LOUIS, DETROIT, PITTSBURGH, HOUSTON, KANSAS CITY

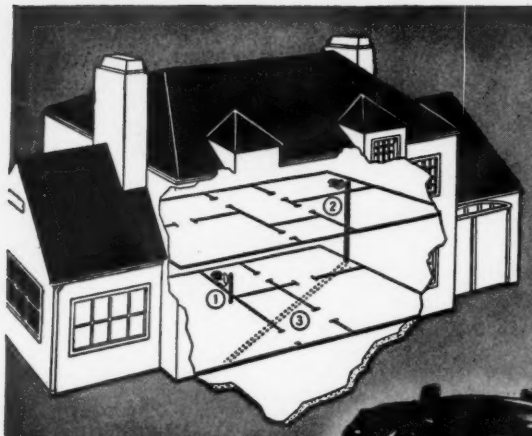
HOTEL FRANCES
MONROE, LA.

EDSON HOTEL
BEAUMONT, TEX.

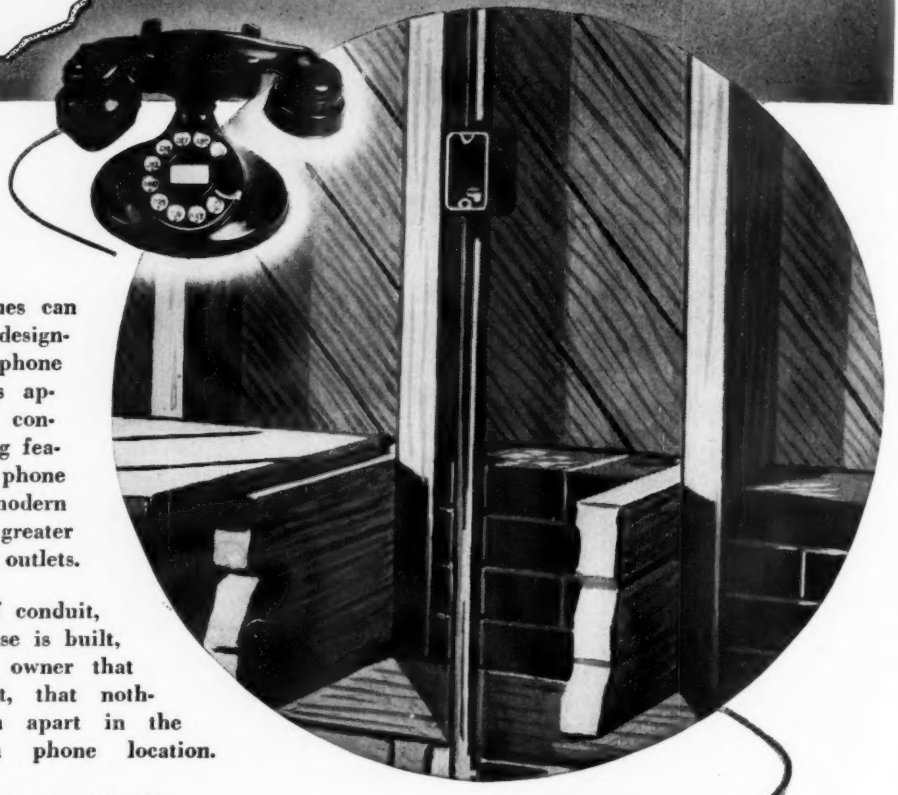
SCOTT HOTEL
DALLAS, TEX.

HOTEL KING
BATON ROUGE, LA.

HOTEL MARKHAM
GULFPORT, MISS.



# TELEPHONE CONDUIT ADDS GREATER VALUE TO YOUR HOMES . . . .



Now still greater values can be added to the homes designed with multiple telephone outlets. Home owners appreciate their added convenience and step-saving features and accept multiple phone outlets as a sign of a modern home. The cost is no greater than standard light outlets.

A few short lengths of conduit, installed when the house is built, give assurance to the owner that the job is permanent, that nothing need to be torn apart in the future to change a phone location.

When it comes to conduit specifications—*specify Buckeye*—the largest selling conduit in America. Buckeye Conduit is made as a very important specialty by Youngstown, and the trade likes it because of its consistent uniformity and easy workability. A Buckeye Conduit specification for phone installations and all electrical requirements is welcomed by discriminating home owners everywhere.

Ask your distributor for Youngstown Conduit - Pipe and Tubular Products - Sheets - Plates - Tin Plate - Bars - Rods - Wire - Nails - Tie Plates and Spikes.

BUCKEYE TRADE MARK YOUNGSTOWN CONDUIT

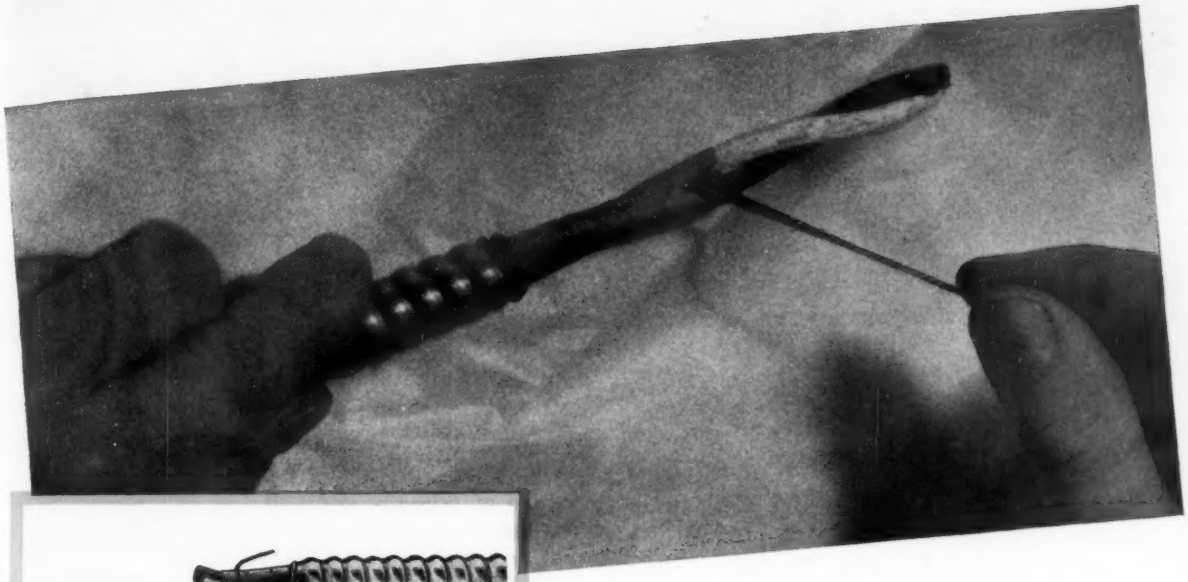
THE YOUNGSTOWN SHEET AND TUBE COMPANY

Manufacturers of Carbon, Alloy and Yoloy Steels

General Offices - YOUNGSTOWN, OHIO



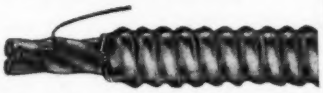
ELECTRICAL SOUTH is published monthly by W. R. C. Smith Publishing Co., Marietta, Ga., and Atlanta, Ga., U. S. A.
Subscription rates, United States and Possessions, $1.00 for one year; $2.00 for three years; Canada, $1.50 per year; Foreign Countries, $2.00 per year.
Entered as second class matter at the postoffice, Marietta, Ga., under Act of March 3, 1879.
**Volume 21** **Number 3.**



**TYPE AC**

The standard type of Armored Cable, with braided conductors and flexible steel armor.

**ARMORED THERMOCABLE**



For control circuits on heating systems, air conditioning apparatus, etc. Sizes 16 and 18, usually three conductors under one covering, but may be made with any desired number of conductors.

**TYPE ACL**

Lead covered conductors. For connections to exterior electric signs and floodlights and for use in damp places indoors. Hazard ACL has protective paper sheath between the lead and steel, which cushions and protects the lead.

**TYPE CA**

Flexible Lamp Cord, Hazacode rubber insulation, each conductor braided and twisted, covered with paper sheath and steel armor. For show window pendants or for pendants in dry places where subject to hard usage.

**ARMORED GROUND WIRE**

Usually No. 4, 6 or 8 AWG copper conductor without insulation, protected from mechanical injury by the flexible steel armor. For grounding wiring systems.

**STOCKED BY ELECTRICAL JOBBERS**

# Install HAZARD ARMORED CABLES

These 5 types of Hazard Armored Cables make it easy for you to select the kind that exactly fills the bill for any purpose where Armored Cable may be used.

For complete information about Hazard Armored Cables, Building Wires, Service Entrance Cables, Underground Cables and Permex Thin Wall Insulation write for these booklets. Copies gladly sent on request.

**HAZARD INSULATED WIRE WORKS**
DIVISION OF THE OKONITE CO.
Wilkes-Barre, Pa.
*Offices in Principal Cities*

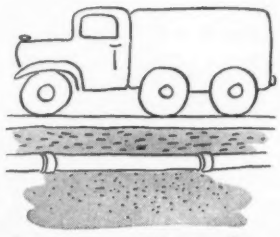
**HAZARD**

**A Complete Line of Insulated Wires & Cables**

# SEVEN FACTS YOU CAN *DISTRIBUTION*

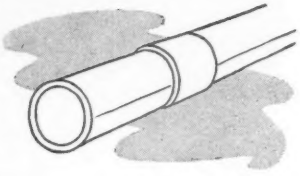
ON ALL TYPES of duct systems—exposed or enclosed, above ground or below—J-M Transite Ducts provide the advantages of economical installation, reduced operating costs, lower maintenance. Briefly listed below are the reasons why utilities throughout the country are finding Transite Conduit and Transite Korduct the logical materials for dependable, trouble-free transmission and distribution lines.

## 1. Transite Ducts Are Strong!

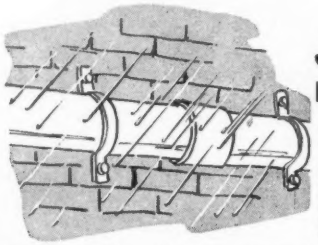


On underground lines, you save the expense of a protective casing when you use Transite Conduit. So strong it needs no concrete envelope, this durable duct holds its true form under sustained earth loads and traffic pressure . . . substantially reduces installed costs, particularly where a small number of ducts per trench is involved.

## 2. Transite Ducts Can't Rot!



Made of asbestos and cement, Transite Ducts are 100% inorganic . . . completely proof against rot or decay. Being nonmetallic, they are also immune to electrolysis. No protective treatment is required to assure long, trouble-free life in underground service.



## 3. Transite Ducts Resist Corrosion!

Maintenance costs stay permanently low when you install Transite Ducts. In exposed locations, their asbestos-cement composition effectively resists weather and corrosive fumes and gases; underground, they offer unusual resistance to the destructive action of aggressive soils.

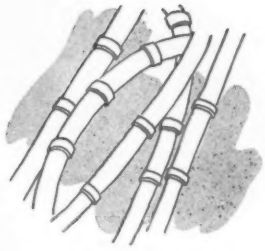
## 4. Transite Ducts Cost Less to Install!

Furnished in long, light lengths, Transite Ducts are handled and assembled easily and economically. Transite Conduit's strength often eliminates

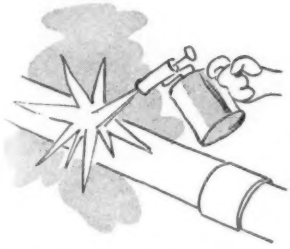
**TRANSITE CONDUIT**—For use underground without a concrete envelope and for exposed locations.

JM PRODUCTS **Johns-Manville**

# USE TO CUT COSTS . . .



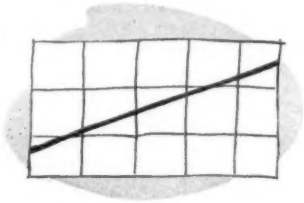
the expense of a concrete envelope. Where "concreting-in" is specified, Transite Korduct's long lengths require fewer spacers, fewer joints. Both make lining up fast and accurate.



## 5. Transite Ducts Won't Burn!

Burnouts have no effect on Transite Ducts. Completely incombustible, they will not generate dangerous gases, fumes or smoke, and provide the equivalent of extra fire-protection between cables. With single conductor, lead-sheathed AC cables, closer spacing may be used, resulting in lower induced sheath voltages.

## 6. Transite Ducts Boost System Capacity!



Transite Ducts provide an exceptionally high rate of heat dissipation. This means increased system capacity or lower cable-operating temperatures with resultant decreased insulation and $I^2R$ losses and longer cable life.

**For full details on how Transite Ducts and other J-M Electrical Materials can help you cut distribution costs, ask for Catalog D. S. 400. Johns-Manville, 22 East 40th Street, New York, N. Y.**

## 7. Transite Ducts Save on Assembly!

A complete line of Transite fittings permits adaptation to varying installation conditions. Curved segments, deflection couplings and sweeps enable easy changes in direction. All are assembled cold . . . machining or cutting is done with standard tools.

### Other J-M Electrical Materials

**Trancell** Cell Structures and Doors are fireproof, light in weight, rapidly and economically erected. Compared with metal, this J-M asbestos product greatly reduces condensation troubles. Because Trancell cannot rust, it never causes shutdowns for cleaning or painting. Compared with concrete, its large, easily handled sheets and dry construction reduce installation cost and its light weight permits housing of equipment in multi-storied buildings without overloading of floors.

**Duxseal** for duct openings is a plastic, non-hardening putty that forms a lasting, tight seal. Easily worked and handled. Adheres firmly to any duct or metal surface. Unaffected by temperature changes or liquids and gases commonly found in underground cableway structures.

**Niagrite-Asbestoment** Cable Fireproofing is a combination of asbestos felt and an arc-proofing cement used for many years to protect adjacent cables from communicated damage due to arcs or to oil or gas fires.

**Asbestos Ebony** for switchboard panels, bus-bar supports, switch bases, etc., maintains its high dielectric strength and insulation resistance in service. Withstands shock and vibration; unaffected by temperature variations; and won't warp or crack.

# TRANSITE DUCTS

**TRANSITE KORDUCT**—For installation in concrete. Thinner walled, but otherwise identical with Transite Conduit.

# Postal

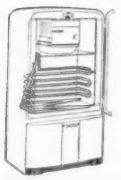
## ELECTRIC APPLIANCE RETAILERS, U. S. A.

## REVOLUTIONARY NEW

## ALL RECORDS . . MOIST

## OF TOTAL SALES AND

**As an Essential Feature of Kelvinator's Long-Range Program — Kelvinator Refrigerators and Ranges are Manufactured by a "Retail-Minded" Organization — they are Manufactured to Sell!**



A major point in Kelvinator's program of planned and organized manufacture and distribution is its attitude toward *product*—either refrigerators or ranges.

Kelvinator refuses to be complacent. It realizes that successful appliance selling is based on sound change.

Kelvinator calls this attitude "retail-mindedness."

Typical of this retail approach to *product* is the 1941 Kelvinator Moist-Master—the outstanding product achievement of the year and a powerful incentive for the replacement market.

It *looks* different—and it *is* different.

In addition to the High-Speed Freezer, a separate set of refrigerating coils are concealed within the walls. Humidity is controlled throughout the cabinet. A glass-enclosed Cold-mist Freshener provides super-moist refrigeration for left-overs and vegetables.

Already the Kelvinator Moist-Master accounts for over 20 per cent of all sales.

It pays to tie up with a "retail-minded" organization.

# Telegraph

## KELVINATOR MOIST-MASTER BREAKING MASTER SALES ALREADY ARE OVER 20% ARE MOUNTING STEADILY.

## Check These Kelvinator Franchise Advantages Against Any Other

**1 EXCLUSIVE EXTRAS...** No other refrigerator offers the exclusive new Magic Shelf—the Stainless Steel Cold-Ban—the Glass-enclosed Cold-mist Freshener cooled by coils within the walls of the refrigerator. And the 1941 Kelvinator Ranges offer new, exclusive features at the lowest prices in history.

**2 STEP-UP PLAN...** A *logical* step-up plan based on the actual retail *value* of each added feature. The *higher* priced models, in both refrigerators and ranges, are easy to sell.

**3 NEW LOW PRICES...** Last year Kelvinator's new price policy revolutionized the industry. This year, step number two in our long-range program reduces refrigerator and range prices even farther, and greater values have been built into every model in the line.

**4 HIGH UNIT SALES...** Last year the average of 80 per cent of all Kelvinator retailers' sales was $160—which we believe sets an industry record. With this year's amazing step-up plan Kelvinator retailers will again sell an overwhelmingly big per cent of higher-priced refrigerators and ranges.

**5 SIZE...** One of Kelvinator's most important *extras* is size. Six cubic foot refrigerators are now six and three-quarter cubic feet—and eights are eight and three-quarter cubic feet—thanks to Kelvinator's new cabinet construction. And all ranges have big, *oversize* ovens.

**6 SELECTIVE MARKETS...** Kelvinator's 1940 policies, carried forward into 1941, have earned for Kelvinator the reputation of putting into actual practice—"a market for every dealer—a dealer for every market".

**7 FEWER MODELS...** By concentrating on the models people really want, Kelvinator has reduced its refrigerator line to *nine* models—its range line to three—and thus reduced the retailer's investment to a minimum and simplified his selling problem.

**8 SERVICE-FREE...** The Polarsphere Sealed Unit has set a record for reliable performance. Of the hundreds of thousands of Kelvinator refrigerators sold last year, less than one-half of one per cent were returned to the factory for service.

**9 REPLACEMENT SALES...** The new and radically different 1941 Kelvinator Moist-Master with its glass shelves and Cold-mist Freshener, offers the most powerful replacement incentive in years. And every 1941 Kelvinator is a *brand new* model. Not one is a relabeled carry-over from 1940.

**10 ADVERTISING AND PROMOTION...** The biggest campaign in Kelvinator's history is already under way with four-color magazine advertising—key city newspaper and transcribed radio spot announcements—new style billboard posters and complete cooperative advertising materials. Selling and product literature is printed in *full-colors*.

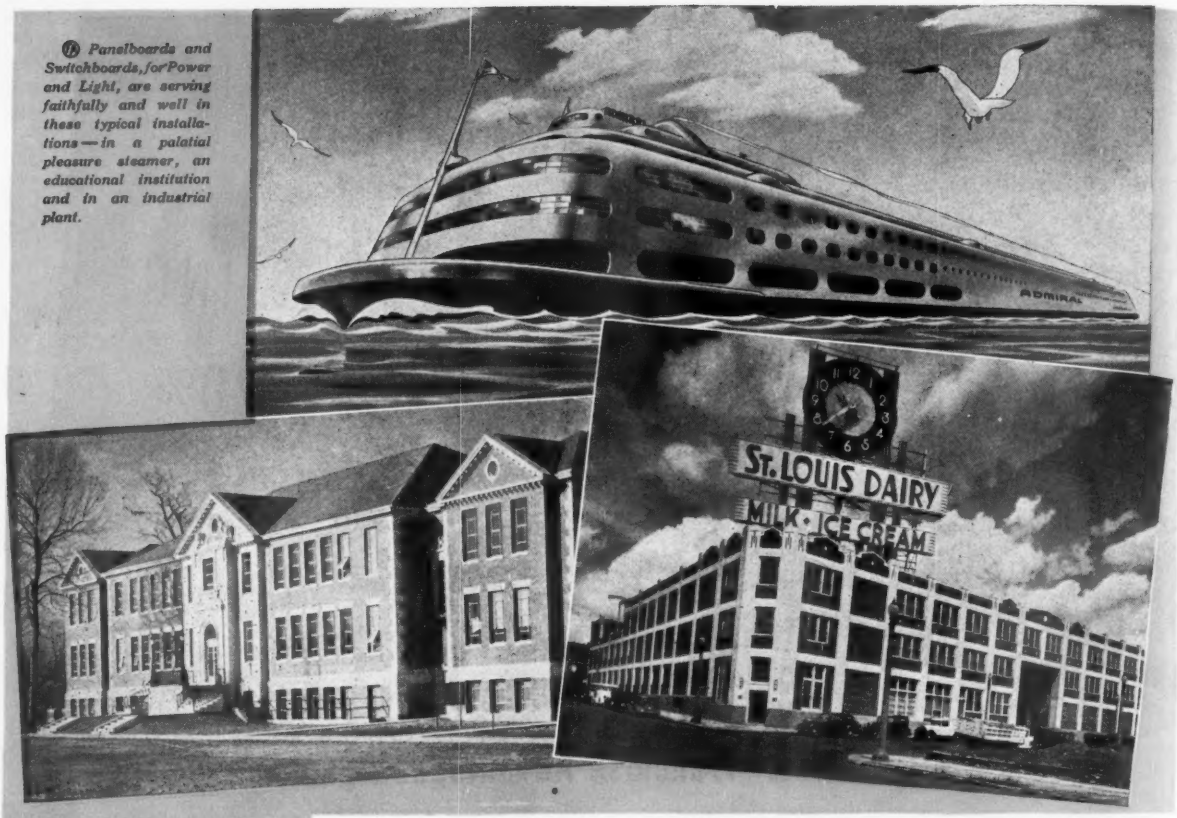
**11 STOCKING...** Kelvinator's Redisco Plan for 1941 provides the most flexible and liberal method of stocking refrigerators and ranges you have ever been offered.

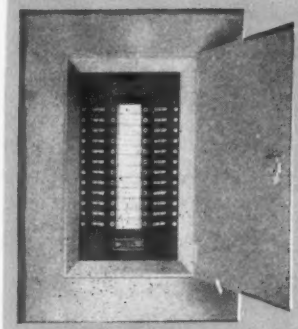
**12 PLANNED DISTRIBUTION AND MANUFACTURING...** A long-range program developed by a "retail-minded" organization to help retailers build an increasingly profitable business.

*Kelvinator Division,* NASH-KELVINATOR CORPORATION, *Detroit, Michigan*

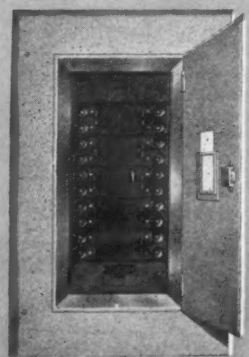
**Get More—Get KELVINATOR**

*Ⓕ Panelboards and Switchboards, for Power and Light, are serving faithfully and well in these typical installations — in a palatial pleasure steamer, an educational institution and in an industrial plant.*



*Ⓕ Type NA1B Dublbrak Circuit Breaker Panelboard, for Alternating Current and Direct Current Service.*



*Ⓕ Type LNT1P-3L Panelboard for Lighting and Appliance Branch Circuits.*

# STANDARDIZED UNITS

## *Make for Quicker Delivery*

Each Ⓕ Panelboard is built of *standardized units.* While each is engineered to meet particular requirements, it is possible to assemble these units quickly for any specific application. This makes for speed in delivery. It also results in improved design — increased efficiency — lowered costs; and, above all, in *dependability and modern protection.*

### Ⓕ Panelboards

are designed for both power and light distribution — in a wide range of types and capacities. These comprise Dead Front, Safety Type Lighting and Appliance Branch Circuit Panelboards in fuse only, tumbler switch and fuse, and circuit breaker types. Also, Power (and Lighting) Feeder Distribution Panelboards, including Pull-out Type Disconnect, Klampswitchfuz Hinged Type Fuse Disconnect, Shutlbrak Switch Type, and Circuit Breaker Types.

All of these are built not only to *meet* the minimum requirements of the Underwriters' Laboratories, Inc., but to *exceed* them. *Built better than necessary,* they fulfill every reasonable demand.

### Engineering Service without Obligation

Architects, Engineers and Contractors welcome the advisory service of Ⓕ Sales-Engineers, available in 30 important centers in the U. S. and Canada. Unbiased, accurate information is thus quickly available. Make it a practice to consult with them. See Sweet's Catalog (Architectural and Industrial-Engineering Sections) or Electrical Buyers' Reference, or write us for the name and address of the Engineer nearest you . . . And ask for Catalog No. 56 . . . Frank Adam Electric Company, St. Louis, Mo.

EST. 1891 — THE SIGN OF A BETTER JOB

Frank Adam

1891 FIFTY YEARS SERVICE 1941

FRANK ADAM ELECTRIC CO. ST. LOUIS, MO. U.S.A.

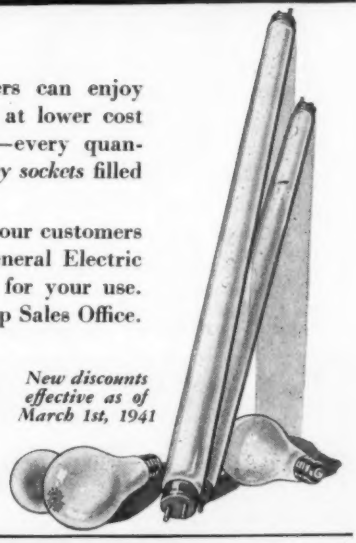
# General Electric Announces Lower Prices on Quantity Purchases of G-E MAZDA Lamps!

EMPTY sockets will be filled with right size G-E MAZDA lamps in thousands of factories, offices, stores, apartments, yes and in many homes, too—as these new, larger discounts are publicized through G-E advertising in magazines and on the air!

Now the small factory, office, shop, restaurant can buy the lamps they *prefer* at generous discounts even on purchases as low as $5.00!

It means that your customers can enjoy Better Light for Better Sight at lower cost than ever before. Remember—every quantity purchase means *more empty sockets* filled with right size lamps!

Because you will want to tell your customers about these new discounts, General Electric has newspaper mats available for your use. See local General Electric Lamp Sales Office.



**G-E MAZDA LAMPS**

**GENERAL ELECTRIC**

*New discounts effective as of March 1st, 1941*

**NEW!** **65-WATT G-E MAZDA F (FLUORESCENT) LAMP** available April 1st. Of special interest to stores, hotels, restaurants, clubs, offices! Colors: Daylight and 3500° White. Size: 36" length, 2⅛" diameter. List price $2.75.

"Here's a bargain I'd go for, Mr. Dealer— a UNIVERSAL electric iron and ironing board—a $9.95 value for only $7.95!"

UNIVERSAL'S Big Spring Special is a bargain ALL women will go for...a $9.95 value for only $7.95, that will speed up sales, increase profits!

"THE HOSTESS" IRONING TABLE... a 5-Star Value!

★ Large Ironing Surface 15 x 54 inches

★ Opens and Folds in One Operation

★ Light in Weight

★ Sturdy Construction

★ Rubber Safety Shoes Grip Floor—NO Marring

The Hostess Ironing Table with its five-star features combines with the new Universal Streamlined Automatic Iron to give you a "special" designed to build floor traffic and to boost profits.

$9.95 Value to retail for only $7.95 FOR BOTH!

UNIVERSAL Streamlined Automatic Wrinkle-Proof Iron

★ New, Cool Easy-Grip Handle

★ Finger-Tip Automatic Control

★ New, Cool Heel Rest

★ Non-Tarnishing Chromium Plate

★ Wrinkle-proof Round Heel

This new Universal Streamlined Automatic Iron in combination with the Hostess Ironing Table gives you a sure-fire offer to help capture the electric iron replacement market. Order your supply of Model No. 7885-41 now.

Dealer's Cost $5.30

Wire or write your order today! Offer good for limited time only!

UNIVERSAL

THE TRADEMARK KNOWN IN EVERY HOME

LANDERS, FRARY & CLARK • New Britain, Conn.

THE SATURDAY EVENING POST
BUY BULBS
that stay brighter longer
...that are the right size
Get rid of Bulbsnatching with Right Size Bulbs
AVOID EYESTRAIN
throw out wrong size Lamp Bulbs
House Cleaning Time is Sight Saving Time with Right Size Bulbs
FORWARD
to Better Light-Better Sight
MARCH
is Right Size Lamp Month
G-E MAZDA LAMP PRICES begin at 10¢
How 7,000,000 lamp bulb purchasers can put
SPRING IN THEIR EYES!
• In too many homes, neglect or bulb-snatching has put the wrong-size lamp bulb in important seeing sockets . . . places where youngsters study, where older people read and sew. Eyestrain is serious. Right-size lamp bulbs cost little to buy—little to use, so why encourage trouble? Protect your family's eyesight and bring Spring freshness to their seeing by making sure that every socket is filled with the right-size G-E MAZDA lamp bulb.
How to tell a wrong size lamp bulb
We suggest this simple guide: in reading lamps your G-E MAZDA lamp bulbs should total at least 100 watts, properly shaded; for sewing or mending, you need about three times as much. Better still, drop in and ask your lamp dealer to help you choose the right size G-E MAZDA lamps.
Study is easier ... when I.E.S. lamps list or at least a 100-watt 15¢
Cheer up your kitchen and lighten tasks with a 150-watt 20¢
Have pleasing indirect light with 150-watt Silvered Bowl 45¢
Enjoy reading more, with 3-lite, 50-200-300-watt 60¢
G-E MAZDA* LAMPS
GENERAL ELECTRIC
*MAZDA—not the name of a thing but the mark of a research service

**85,000 DEALERS will get this G-E tie-in display for RIGHT-SIZE LAMP MONTH**

## THIS AD WILL FILL MILLIONS OF EMPTY SOCKETS THIS MONTH!

**THIS POWERFUL** four-color ad appears in March 1st Saturday Evening Post. Here's an activity built to order for you. Thousands will see this compelling four-color right lamp message in the March 1st Saturday Evening Post and March 2nd American Weekly. Thousands more will see reprints of this ad in dealer's windows and on dealer's counters.

**AND HERE'S WHAT YOU CAN DO ABOUT IT**

1. Feature Right Size Lamps in your own lamp displays.
2. Urge dealers to use Right Lamp display material.
3. Tie up with Right Lamp advertising in local papers. Newspaper mats available.

# NO CRYSTAL GAZING,

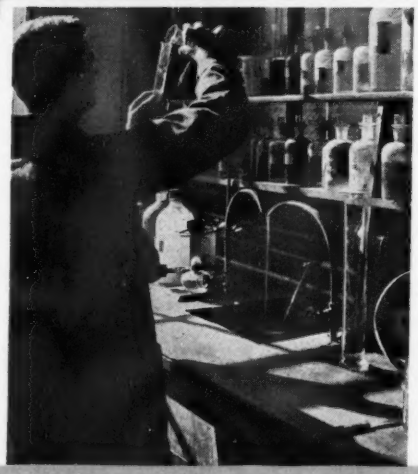
## but we DO see into the future

**Chemical and metallurgical research in cable materials predetermines operating behaviour of new designs and constructions**

Behind the quality of Anaconda stands the painstaking and precise analysis of the trained engineer and research chemist. Searchingly, unceasingly, they gaze into the future . . . the future performance of every inch of Anaconda Wire and Cable . . . but *their* tools are the exact and unimpeachable instruments of science.

Their findings, with numerous other tests, both chemical and physical, unite to form a strict manufacturing control from which Anaconda develops new and better products to meet and exceed the ever-increasing needs and specifications of the customer. 40356

ANACONDA
from mine to consumer



*Keen eyes peer through this metallographic microscope looking for flaws and weaknesses in metal samples. Only those that pass this man's expert scrutiny . . . those that measure up to Anaconda's standards . . . are passed.*

•

*The "cocktails" this technician mixes are tasty libations for Anaconda customers. For, as a result of his mixtures, Anaconda wires and cables perform more efficiently, last years longer.*

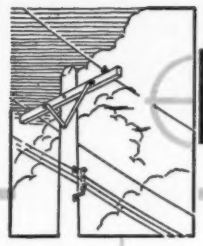
USE MODERN IMPROVED **Anaconda Wire & Cable**

ANACONDA WIRE & CABLE COMPANY, General Offices: 25 Broadway, New York City; Chicago Office: 20 North Wacker Drive

*A Subsidiary of Anaconda Copper Mining Company. Sales Offices in Principal Cities*

*MARCH, 1941*

Volume 21 No. 3



# ELECTRICAL SOUTH

J. C. MARTIN, Manager
RICHARD P. SMITH, Promotion Manager
W. E. COOGLER, Production Manager

*Editorial and Business Offices*
GRANT BUILDING
ATLANTA, GEORGIA

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MEMBER OF A. B. C.

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THREE YEARS—$2.00
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*Published Monthly by*
W. R. C. SMITH PUBLISHING CO.
Marietta and Atlanta, Ga.

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COTTON
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SOUTHERN POWER AND INDUSTRY

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*Electrical Features of the*

# Bankhead Vehicular Tunnel

By Alvin A. Johnson

ENGINEERS who designed the $4,000,000 Bankhead Vehicular Tunnel under Mobile River at Mobile, Alabama, devoted particular study to the lighting features.

Lighting plans for the Holland and Lincoln tunnels—great vehicular tubes linking New York City's borough of Manhattan with the populous and industrial Jersey shore—were carefully scrutinized and improved wherever possible.

As a result, engineers believe they have reached the zenith in electrical perfection in the illumination scheme worked out for the Bankhead tube which will be opened to traffic in late February or early March.

Most important element in traffic tunnel lighting, the engineers learned, is the avoidance of eye-shock to motorists entering and leaving.

The sudden plunge into a dark tube from intense daylight momentarily blinds the motorist's eyes and thus produces a traffic hazard. Likewise, to suddenly enter a brightly-lighted tube after driving some distance at night causes the driver to momentarily lose the full control of his vehicle.

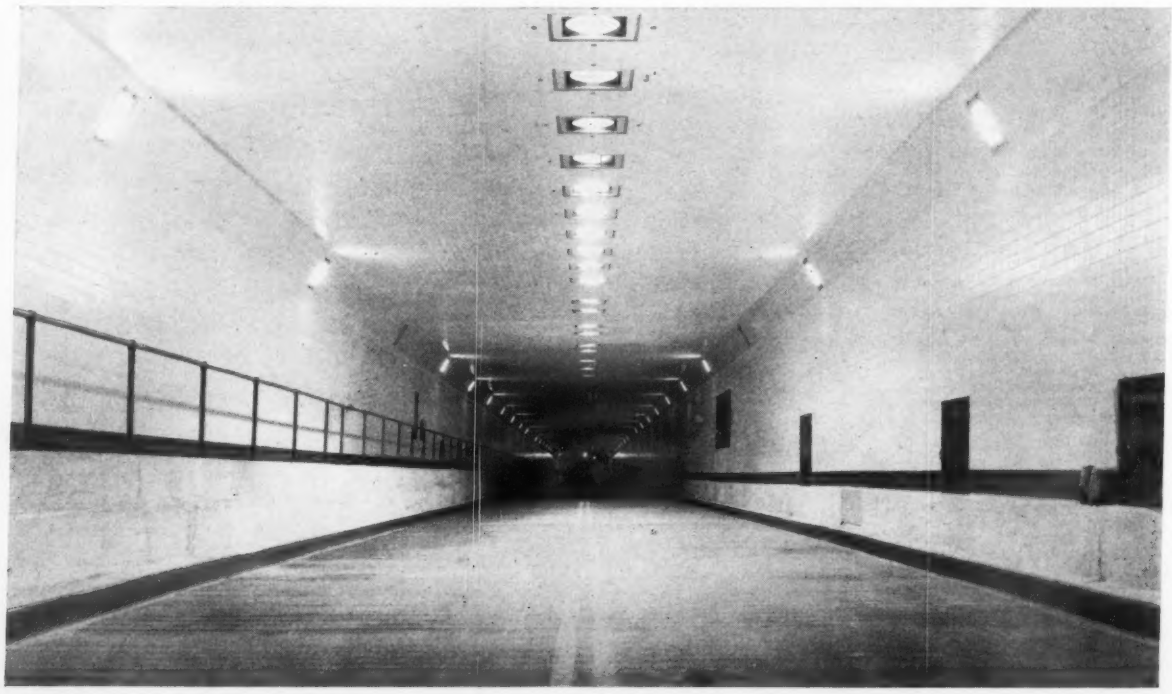
The latter problem was solved through gradual intensification of light along the approaches to the tunnel entrance. But the daylight problem was more difficult to cope with. Several systems of light intensification at the portals were tried and discarded before the present one was hit upon.

Now the motorist may approach the tunnel on the sunniest day and find no "dark hole" ahead of him.

Cleverly devised nonglare lighting, by means of flush fixtures, proved the answer to the puzzle. Harry A. Sauer, superintendent of Miller Electric Company, of Jacksonville, Fla., who had the electrical contract on the vast project, described these as "supplementary lights" which are used only in daylight.

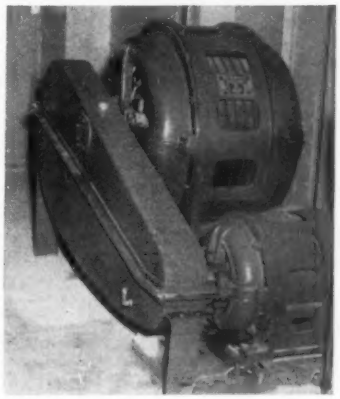
Recessed into the ceiling, they extend for approximately 130 feet toward the center of the tube from each portal. Twenty-one globes are used at each terminus to obtain the desired effect. The first 12 units carry regular 750-watt incandescent lights, the next four are 500-watts, while the next five are 300-watts.

These fixtures are covered with heavy, frosted glass. The glass is designed to diffuse and "temper" the light from the high-wattage bulbs without reducing their value. The decorative tile lining the entire tube also plays a part in this respect. Though it appears white, the tile on close examination will prove to be slightly tinted, for the purpose of reducing the glare.



**Night view of the recently completed Bankhead Vehicular Tunnel just out of Mobile, Alabama.**

**Left above, an overhead shot of one of the three giant fans which ventilate the 3,389-foot tunnel. Each fan has an exhausting capacity of 274,000 cubic feet per minute. Two of the fans will provide a complete change of air in the tunnel every two minutes. The third fan is held as a standby in case of emergency. Right above, the switches for controlling the three fans. Right, each of the fans is driven by a 350 horsepower motor. Note the smaller motor, rated at 10-40 horsepower, geared to the large motor. It is used to bring the fan and large motor nearly up to speed before the large motor is energized. Below, Harry A. Sauer, superintendent for Miller Electrical Company, which made the electrical installation in the tunnel, operates the master switchboard in the control room of the ventilation building. This board is called the "brains" of the tunnel and from it an operator controls every phase of the tunnel operation.**



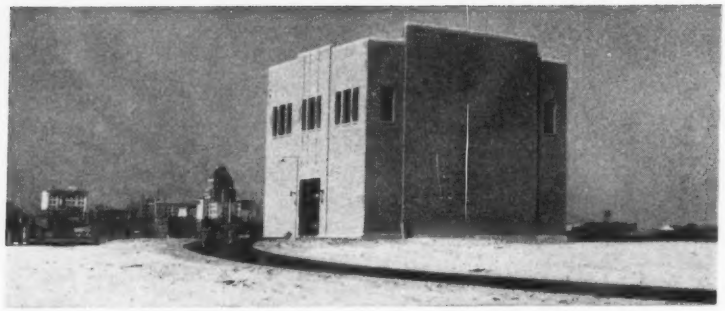
Entering the tunnel at normal speed from daylight, the motorist will not immediately notice the concentration of lighting just within the portals, because the intensification is so gradual from mid-tunnel as to be evident only on special observation.

Upon entering the tunnel from either portal the motorist first passes through what is called a "steel bent" section before entering the 2,000-foot underwater circular tube section.

These steel bent sections are lighted by 74 200-watt lights recessed into the cove or side walls at 30 feet intervals. The circular or subaqueous sections are lighted by 42 300-watt lamps which are suspended from the ceiling at 50 foot intervals.

A unique system of ventilation was decided upon by the engineers to insure the tunnel of a constant flow of fresh air. However, before explaining the system of ventilation used, it would probably be better to get a mind's picture of what the Bankhead tunnel looks like.

The tunnel—only vehicular tunnel ever constructed in the South—connects the foot of Government Street in downtown Mobile with the Old Spanish Trail (U. S. Highway 90) on Blakely Island in Mobile River. The tunnel is 3,389 feet in length from grade point to grade point and will reduce the distance into and from Mobile by some 7½ miles of travel over winding, commercial streets and bridges.



**This peculiarly utilitarian structure with the city of Mobile skyline in the background is the ventilation building which houses practically all the electrical equipment for operating the $4,000,000 Bankhead Tunnel. The building situated on the Blakely Island side of Mobile River straddles the underwater tube. On each side of the building are large vents from which air drawn out of tunnel through an underroad air duct is expelled.**

Like the Detroit vehicular tunnel, the "trench" method was used on the Mobile project. At a point about four blocks back from Mobile River, on Government Street, there is a 280-foot open ramp section, followed by 452 feet of cut-and-cover, then 2,000 feet of steel tubing (composed of sections ranging in length from 225 to 295 feet) and finally 656 feet of cut-and-cover work on the island terminus.

The general idea in tunnel ventilation was departed from on this project. The longitudinal rather than transverse system was installed. A reinforced concrete, brick and steel ventilation building—a peculiarly utilitarian structure reared on the skyline of Blakely Island—straddles the tube like a man on horseback, with exhaust vents on either side to draw impure air out of the tube.

This building also houses three of the largest fans ever built for tunnel use. No blowers are used. Air is drawn into the tunnel through the portals to the deepest point in the tube. There it is exhausted into the air duct below road level through vents at curb level along a 40-foot section in mid-tunnel, pulled into the ventilation building and expelled through the roof.

Each of the fans are capable of exhausting 274,000 cubic feet of air per minute. With two of the fans running while the tunnel is in use, motorists are assured of a complete change of air every two minutes.

The 16-inch concrete slab pavement which runs through the tube section is placed about one-third the way up from the bottom of the tube, forming an air duct underneath.

The three large fans are powered by three 350-horsepower motors, while three smaller 10-40 horsepower motors are used to start the huge fans without damaging the larger motors. After the smaller motors get the fans operating at second speed, they transfer the load to the larger machines.

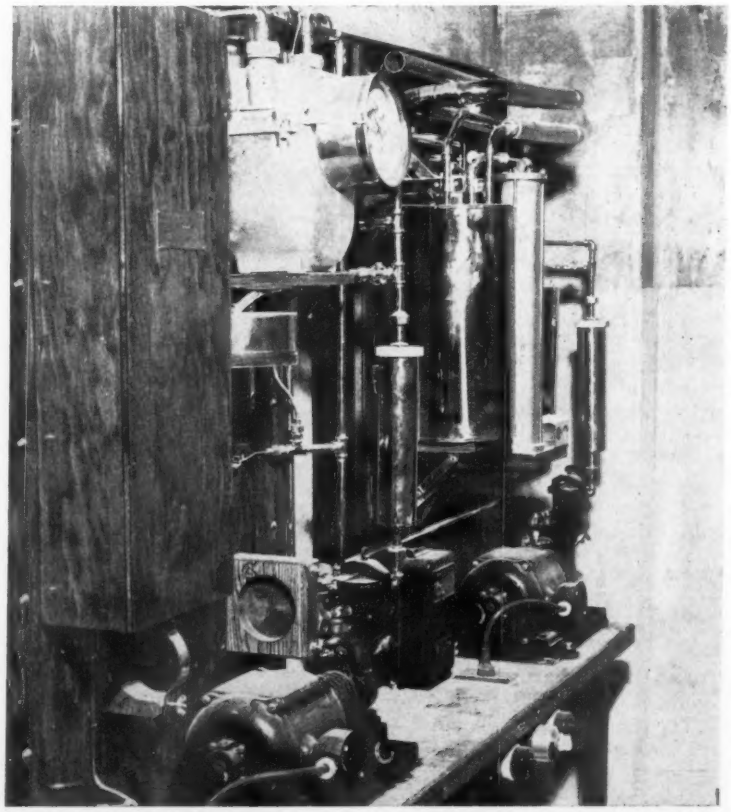
Only two of the three fans, running at second speed, are used to maintain proper ventilation for average use of the tube. The third fan is a standby and the third speed is a safety or emergency feature used to draw smoke out of the tunnel if the occasion arises.

Each of the fans weigh two tons in their complete steel casings. They operate on roller-bearing shaft and cannot be heard in the fan room while going at top speed. The eight-inch blades make 350 revolutions per minute in third speed, as compared with about 120 rpm in low.

The fans are also equipped with large 10-foot square steel dampers which help regulate air flow from the tube. The huge pit in the four-story ventilation building is some 40 feet below the surface of Mobile River.

The ventilation building houses another intricate piece of machinery known as a carbon monoxide analyzer. It automatically regu-

*(Continued on page 68)*



**This intricate piece of mechanism is the carbon monoxide analyzer which tests frequent samples of air drawn out of the tunnel to be sure the CO content is never more than 4 parts in 10,000. When the content exceeds this amount the device regulates the fans in order to remedy the situation.**

**Development of this type of low cost line construction has greatly aided the rural electrification program of the Arkansas Power and Light Company. The line does not require cross arms and uses a single bushing type transformer. The energized conductor is carried on an insulator on the top of the pole and the ground neutral is fastened to a special holder on the side of the pole**

# Rural Lines Extended In Five Year Program

By Edgar Chesnutt
Arkansas Power & Light Co.
Pine Bluff, Ark.

THE Arkansas Power and Light Company has just rounded out a five-year program of rural electrification effort that contains numerous outstanding features.

Launched early in 1935, shortly after Harvey Couch, president of the company, returned to his native state after serving under two presidents as a director of the Reconstruction Finance Corporation, the program resulted in construction of more than 2,000 miles of new type low cost construction lines. Today the company is serving 14,243 rural customers with more than 3,000 miles of strictly rural line which represents an investment of more than $2,500,000.

Several factors were involved in development of this highly successful rural electrification program. First and fundamental was the development of a new type of rural line, which reduced the cost of construction to about $500 a mile, about 50 per cent of the cost of previous types of line. This reduction was made possible through using a single bushing transformer, smaller poles, and the use of a new type of bracket for conductors which eliminated use of cross arms.

In order to assist farmers obtain funds for wiring their homes, making the payments on appliances and meeting other costs, the Arkansas Power and Light Company employed them in constructing their lines. Wages equivalent to those paid regular construction crews were paid. Through this policy, many additional customers were obtained. At the same time, a Rural Development Department was established to assist farm customers increase their income through better producing plans and improved marketing plans. Naturally this work stressed the increased benefits of electric service and in this manner additional load was obtained from the additional customers.

One of the most successful features of the rural electrification programs was in the use of protected neutral cable in house wiring installations.

"There has not been a single

*(Continued on page 21)*

**Building more than 3,000 miles of rural electrification line to serve more than 14,500 customers, the Arkansas Power and Light Company has extended its service to all classes of country homes. Here are two contrasting types of rural homes served, both within a few miles of each other in North Arkansas.**

# Electrically Heated Homes For Smokeless Community

By Warner Ogden

ELECTRICITY will play an important part in Knoxville's first community restricted against smoke. Called "Highland Hills," this new addition offers modern, attractive homes, some in a grove of trees, on a gently sloping hill, along a long circular drive at the western edge of the city, from where the Great Smoky Mountains may be glimpsed.

Most of the new homes are a radiant white, and they should stay white longer than most homes. The reason is found on a sign in front of new homes or those under construction. It reads: "An Electrically Heated Home by Fonde."

Electrical heating explains too why Highland Hills is called "Knoxville's first smokeless community." It is perhaps the first community of its kind in America —built by private enterprise.

The new smokeless community is the idea of Stuart Fonde, hustling contractor, who has already built $300,000 worth of other homes, including Forest Court, Century Court, Hedgewood, and numerous scattered residences, many of which were electrically heated.

An electrical contractor, Briscoe Electric Company, has done most of the eletrical heating installations. Panel heaters were installed, one or two for each room. Each heater varies with the size of the room, from 3,000 watts down. In large rooms, there are two 2500-watt heaters. A bathroom and a kitchen usually has a 1500 watt heater.

For heaters No. 12 wire was used, No. 14 for lighting, No. 10 for feeder circuit, No. 8 for range circuit, and No. 12 for water heater circuit.

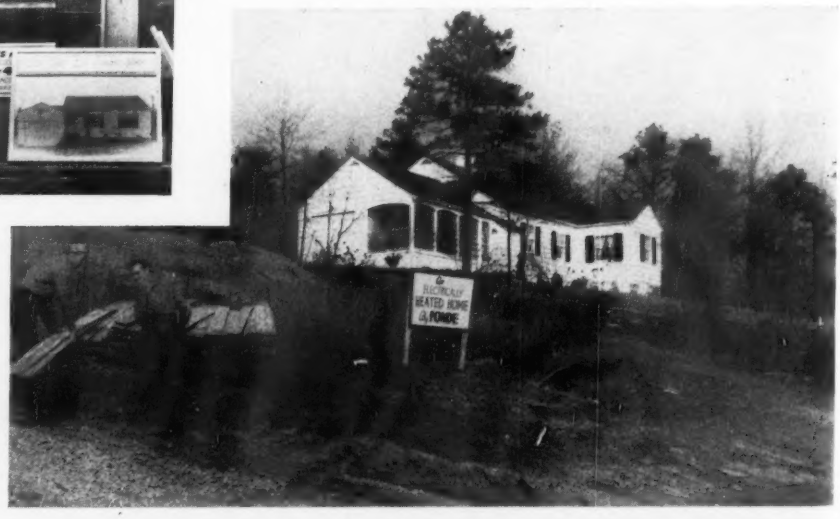
W. E. Briscoe is pleased with the results, and sees a trend toward electrical heating in modern new homes.

The City Power Board in Knoxville was so impressed by what had been accomplished that an exhibit was placed in its display window in the business district. It showed a cross-section of a Fonde home, in miniature, featuring the care used in construction. Electrically heated homes were also pictured, with the exact monthly electric bills of each. The electric heaters used were also displayed.

As a result, a venture into electrical heating, begun in a small, experimental way, has grown until today it has gained acceptance with those wanting new homes. But the success of electrical heating depends much on proper insulation and weatherstripping. Without insulation, as much as 50 per cent of fuel cost is wasted.

Mr. Fonde has built homes for all kinds of heating and he has kept figures on costs. A comparison between oil, coal and electrically heated homes one winter showed that it cost approximately $54 per year for electricity against $36 for coal or oil in the average five-room house.

But, Mr. Fonde points out other factors which offset this difference: "To the cost of the average four or five-room house, there would have to be added approximately $300 to cover the installation of a utility room or base-




**At right, one of the new homes in Knoxville's first smokeless community. Notice the sign. Because of the interest indicated in electrical heating of new homes, the City Power Board has exhibited the window display shown above. It not only shows the type of heaters that are being used, but also shows how a house must be built in order to use electrical heating advantageously.**

ment, flue, and heating plant for oil or coal over the cost of building the same house equipped with electric room heaters. On the FHA plan, the coal or oil-heated home will cost in payments approximately $2.40 more per month or about $28.80 more per year to purchase, the houses having identical floor space. This additional cost in the purchase price added to the coal or oil cost makes the yearly outlay nearer the same for all types of heat.

"In other words, $28.80 would have to be added to the $36 coal or oil bill, making the cost $64.80 as against $54 as shown for the electricity. To be conservative, add this $10 difference to the cost of electricity, thereby making the new electrically heated home cost the same as the others, or $64 per year.

"There are yet other factors to consider which tend to change the picture somewhat. The coal furnace with stoker and the oil furnace will each cost no less than $300 to replace when worn out. The average life of each is perhaps 15 years. During the 15 years each will require no less than one service call or repair call per year of no less than $5 each. These units will cost $25 per year to service and replace.

"The manufacturers of the electrical units claim over 30 years' life for the elements in their heaters. The cost to replace an element is 75 cents. There are about 16 elements to the average house which would therefore cost $12 to replace once or about $1 per year to service and maintain. With these service and replacement costs added in, we now have the following relative costs:

### Comparative Costs

"Coal heated home — $36 plus $28.80, plus $25, equals $89.80 per year.

"Oil heated home — $36, plus $28.80, plus $25, equals $89.80 per year.

Electrically heated home — $54, plus $10, plus $1, equals $65 per year.

"One may draw his own conclusion as to attention needed and cleanliness of the various types of heat."

Emphasis is put on insulation in the electrically heated homes which Fonde builds. On that he says: "Too much stress cannot be laid on insulation. Every home buyer pays for insulation whether he has it or not and the one without it pays much the greater price.

"The word insulation applied to a home alone will not suffice; it is the degree to which a house is insulated that counts. A small amount of insulation will do little or no good; the proper amount of insulation poorly applied will give unsatisfactory results. It is therefore of paramount importance to use the maximum of the proper insulation and install it properly to get the best results.

"Weatherstripping of doors and windows is likewise necessary and should be well done. A complete weatherstripping and insulation job will cost about 4 per cent of the cost of the small home and will amortize itself in about ten years in fuel costs and give added winter and summer comfort to the occupants.

"Today, all prospective home owners of homes costing $3,000 and up should avail themselves of practically every convenience electricity offers. Insulation, weatherstripping and electric heat are all within the reach of home buyers who should demand them."

Although old homes may be electrified, a careful study and engineering would be necessary. A complete weatherstripping and insulation job would have to be done. Where rooms are large, ceilings high, and there are large glass areas, electrical heating would be expensive, according to Mr. Fonde.

Many of the more recently built smaller homes could be converted to electrical heat. The cost to heat a well-insulated and weatherstripped home with normal amount of windows and 8 foot ceiling height should run about 6 cents per square foot floor area per season, with electrical energy available at rates comparable to those of Knoxville, the Fonde figures show.

Many prospective home owners stress size of the home above the quality. On that, Fonde frankly cautions: "The cost of electrical

*(Continued on page 66)*

**Electrical heating is not the only electrical feature of the homes built in Knoxville by Stuart Fonde, of H. C. Fonde & Son, in the new "smokeless community." As the illustrations above indicate, these homes are truly all-electric. At left, Miss Frances Wiley, of the City Power Board, snaps on a fluorescent lighting fixture in the dining room of one of the all-electric homes. Just at Miss Wiley's right is one of the flush type 3000-watt automatic electric room heaters. At right, from top to bottom, kitchen ventilating fan, another of the wall type heaters, and H. C. Fonde examining one of the electric kitchens. Attic ventilating fans also are installed in these homes.**

# Code Rules for Services

***Clarification of established rules and recognition for new practices relating to electric services are discussed here***

By B. Z. Segall*

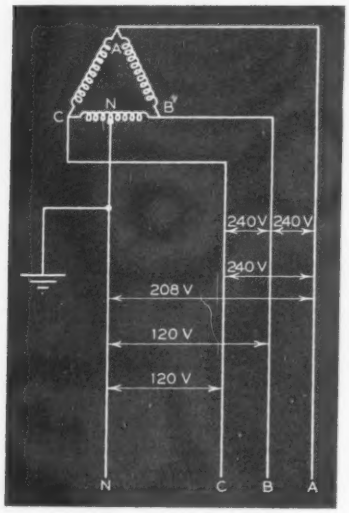



**Fig. 40. A code revision now permits the use of the uninsulated neutral for any service conductors having a nominal voltage to ground of 208 volts or less. This gives formal recognition to the use of uninsulated service conductor neutrals for four-wire, delta installations where the voltage for a 240-volt transformer bank would be approximately 208 volts from the grounded neutral point "N" to the phase "A".**

IN GENERAL, the service rules in the 1940 Code are quite similar to the rules of the 1937 Code. Many editorial revisions have been made to clarify the language and intent of the rules and several changes have been made to give formal recognition to certain practices which have been in use but not necessarily officially recognized.

Two changes have been made in the provisions for the service conductor insulation requirements. The first of these provides for a simplification of the rules for the use of the uninsulated neutral service conductor. The 1937 Code provided, through Section 2595a, that such construction would be permitted only in the case where at least one additional ground had been installed on the secondary distribution system. It is now mandatory to have this additional ground since new Section 2523 (old 2533) is augmented to include such a requirement. The use of the uninsulated neutral in the service entrance conductor assembly, therefore, is acceptable.

A supplementary minor revision of this Code section permits this type of neutral for all service conductors having a nominal voltage to ground of 208 volts or less. This gives formal recognition to the use of the uninsulated service conductor neutrals for 4-wire, "delta" installations where the voltage for a 240-volt transformer bank would be approximately 208 volts from the grounded neutral point "N" to phase "A", as shown in Fig. 40.

The second change in this new section 2304 permits the use of the uninsulated neutral for underground service conductors. This is provided for by the new exception inserted at the beginning of the "b" paragraph of this section.

Formal recognition is now given to another time proven practice. New Section 2307d permits the introduction of splices in the service entrance conductors to make connections to a new outdoor meter loop inserted in an existing installation. This is illustrated in Figure 41.

The rules for service drop clearance have been extensively re-

*New Orleans Public Service, Inc. New Orleans, La.

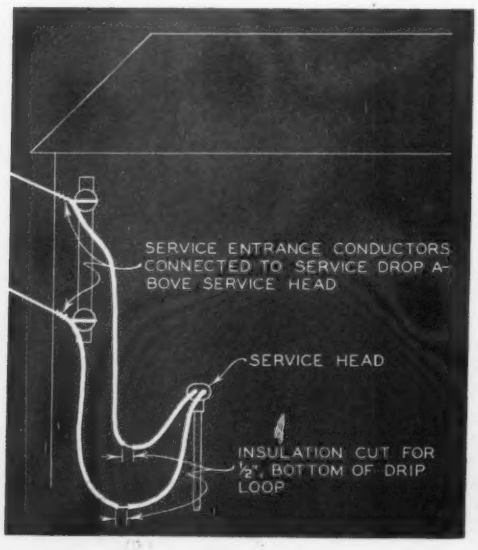
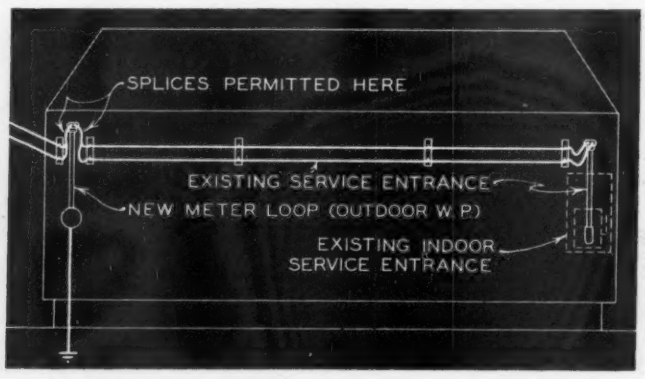

SERVICE ENTRANCE CONDUCTORS CONNECTED TO SERVICE DROP ABOVE SERVICE HEAD
SERVICE HEAD
INSULATION CUT FOR ½", BOTTOM OF DRIP LOOP

**Fig. 41. (Below) The 1940 Code now gives formal recognition to another time-proven practice, the introduction of splices in the service entrance conductors to make connections to a new outdoor meter loop inserted in an existing installation.**

**Fig. 42. (Left) A new requirement of the Code is illustrated. The insulation must be completely removed, for a minimum distance of ½ inch, at the lowest point of the drip loop.**



vised. It is now required that these conductors have at least 36 inches of clearance from all readily accessible windows, doors, and porches. Also the clearances above sidewalks, roadways, etc., have been definitely fixed instead of being defined by ambiguous phrases such as "high above ground as the height and form of the building and local conditions of clearance from adjacent objects will permit." A maximum height of 30 feet is now permitted for the installation of the service drop conductor attachment.

Several changes have been made in the requirements for the service entrance conductors on buildings. The formal recognition of busways for service entrance conductors, of course, is new. Also, several new requirements have been included as to the minimum separation of individual service entrance conductors. Service entrance cables (Type SE, ASE, etc.,) must now be supported every 4½ feet, minimum, instead of 15 feet as in the previous code edition.

Two new general construction standards have been formulated for the installation of the service head or its equivalent. The first change requires that the gooseneck formed at a service cable termination "be held securely in place," first by its connection to the service drop conductors below the gooseneck" or secondly, "by a fitting approved for the purpose." This now requires proper installation and support of the goose-neck.

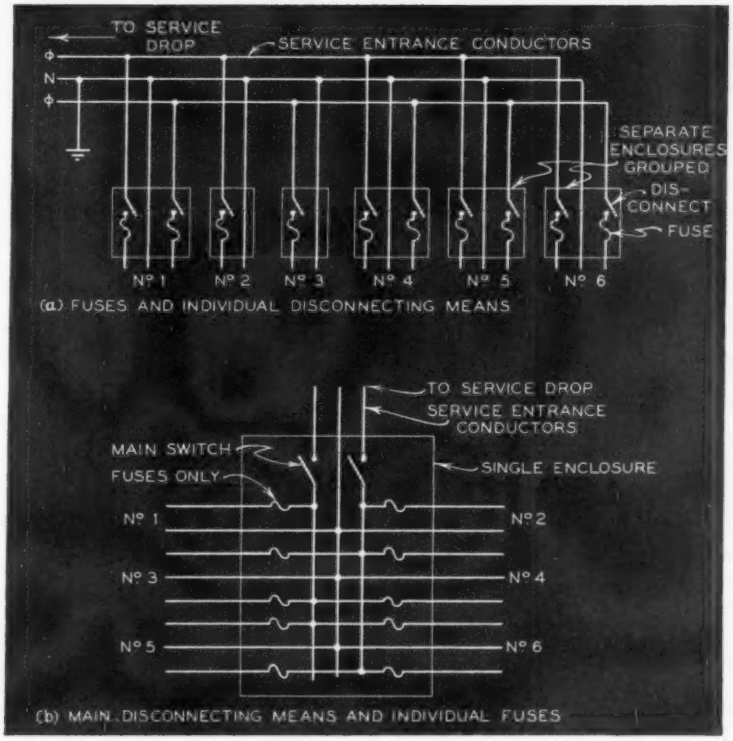



**Fig. 43. In the 1937 Code, the rules for overcurrent protection set up two definite standards where fuses were to be installed for the protection of the ungrounded service entrance conductors. These two conditions are illustrated in (a) and (b) above. Six or less sets of fuses could serve as the service overcurrent device if, in (a), each set of fuses was controlled by an individual disconnecting means, or, in (b), if the fuses were in the same enclosure with a main disconnecting means. The 1940 Code simply permits the use of six or less circuit breakers or fuses as the overcurrent device.**

The second change is a new requirement and is illustrated by Figure 42. As shown by this diagram the service head is below the connection of the service entrance conductors to the service drop. Under these conditions the insulation must be completely removed, for a minimum distance of one half inch, as shown, at the lowest point of the drip loop to allow the entrapped moisture to drain out. Moisture enters into the wires by capillary action at the point of connection of the service drop and the service entrance conductor. In addition a hydrostatic head (pressure due to difference in water level) is formed and this coupled with the natural capillary action forces the water into the service entrance conductors within the raceway. Within time water is found to accumulate in weatherproof meter bases, switches, etc. The removal of the conductor insulation at the lowest point tends to relieve the pressure and permits proper drainage of the moisture. It should be noted that in all probability such construction will be prohibited by some serving companies in their effort to

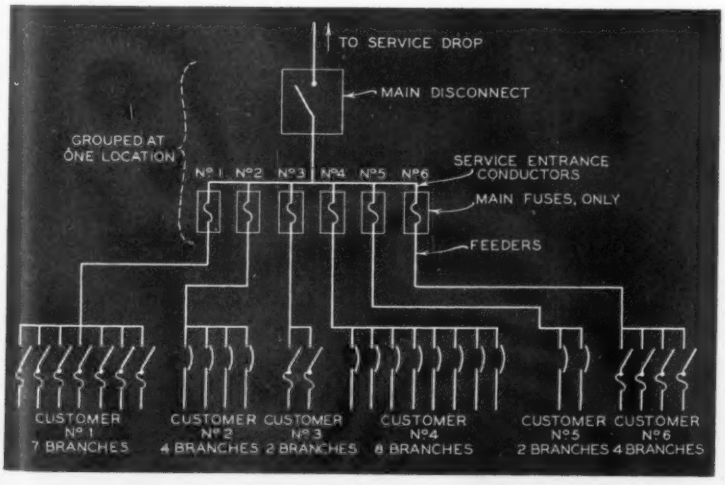

TO SERVICE DROP
MAIN DISCONNECT
GROUPED AT ONE LOCATION
Nº 1 Nº 2 Nº 3 Nº 4 Nº 5 Nº 6
SERVICE ENTRANCE CONDUCTORS
MAIN FUSES, ONLY
FEEDERS
CUSTOMER Nº 1 7 BRANCHES
CUSTOMER Nº 2 4 BRANCHES
CUSTOMER Nº 3 2 BRANCHES
CUSTOMER Nº 4 6 BRANCHES
CUSTOMER Nº 5 2 BRANCHES
CUSTOMER Nº 6 4 BRANCHES

**Fig. 44. It is only necessary to keep the total number of service subdivisions to six or less in order to comply with the Code. No limitation has been set on the size, nor the number of poles in each subdivision. After passing through the main service entrance of six or less circuits, each subdivision may be divided into any number of circuits as shown in this "one-line" diagram.**

keep the service entrance conductor insulation intact throughout.

The rules for the disconnecting means and over-current protection have been editorially revised and clarified. For one thing, both fuse and circuit breaker protection have been placed on a common basis. All rules are expressed so that either type of protection may serve as an alternate for the other type, respectively. This is especially true in the rewording of the requirements for the over-current protection in the ungrounded conductors.

In the 1937 Code (Section 2371a 3 & 4) the rules for over-current protection had set up two definite standards where fuses were to be installed for the protection of the ungrounded service entrance conductors. Six or less sets of fuses could serve as the service over-current device if:

**(a) Each set of fuses was controlled by an individual disconnecting means (See Figure 43a), or**
**(b) The fuses were in the same enclosure with a main disconnecting means (See Figure 43b)**

The present code simply permits the use of six or less circuit breakers or fuses as the over-current device (Section 2371a 3). The 1940 Code, of course, still requires the grouping of these devices, through the rules set up for the disconnecting means in Section 2351 and the rule for the location of the over-current device in Section 2372.

Several combinations and variations may be made. It is only necessary to keep the total number of service subdivisions to six or less to comply with the rule. No limitation has been set on the size, nor the number of poles in each subdivision. After passing through the main entrance of six or less circuits, each subdivision may be divided into any number of circuits as shown by Figure 44.

The new Code will permit, for example, the use of a main switch controlling six or less sets of fuses in separate enclosures, provided these are grouped at a readily accessible location. Figure 45 illustrates this type of construction. It should be noted that this would have been a direct violation of the 1937 Code (See Figure 43b).

A very interesting variation of this code section is shown in Figure 46. The four-circuit service entrance cabinet has two unfused taps. Adjacent to this main cabinet is a second cabinet fed from the unfused taps. It will be seen that there are only six main subdivisions of the service even though twelve branch circuits are being served.

Several minor revisions will be found. The manually operable circuit breaker used for service disconnecting is now required to have a handle for "mechanical" operation rather than "direct" operation, by hand. The use of the word "mechanical" more completely conveys the intent that the usual mechanical link mechanism, connecting the circuit breaker handle to the circuit breaker proper, is acceptable for operation of the service disconnect, within the requirements of the Code.

Another revision now permits the installation of surge protection capacitors ahead of the main service disconnect and protective device.

There is only one addition to the rules in the section on grounding of service equipment. The last sentence of Section 2382a is new and permits grounding to the service neutral conductor of the meter cabinets, etc., which are installed ahead of the service equipment, provided:

**(a) An insulated service neutral is installed and**
**(b) That the nominal voltage to ground does not exceed 208 volts.**

The rules for service exceeding 600 volts have been extensively re-edited and revised. Several major changes have been made in an attempt to somewhat liberalize the requirements.

It is now permissible to install service conductors for equipment operating at a maximum of 15,000 volts without a vault. The service entrance equipment, however, must consist of metal enclosed switchgear.

The next change is a revision of the rules for over-current protection of high voltage services. Formerly, if service equipment was installed in an approved vault, the over-current protection and disconnecting means could be provided by a "suitable" fuse without any switch or circuit breaker. To comply with this rule, however, the circuit had to be 5000 volts or less between conductors and the load limited to 100 kva per phase. The 1940 Code sets up two circuit conditions for such protection:

**(1) The circuit must not exceed 2500 volts to ground and cannot be rated at more than 300 amperes, or**
**(2) The circuit must not exceed 7500 volts between conductors and rated at 100 amperes or less.**

The modifier "suitable" has been deleted and the rule clarified in the new Code so that the fuses must be "oil filled or other fuses . . . that may be operated as a disconnecting means . . . "

The 1937 Code permitted the use of a non-automatic oil switch and suitable fuses for the disconnect and the over-current protection, respectively, for circuits rated at 25,000 volts or less between conductors. These, however, could be installed only, if:

**(a) The service equipment was in a vault, and**
**(b) The load did not exceed 200 kva per phase.**

The new Code deletes the second

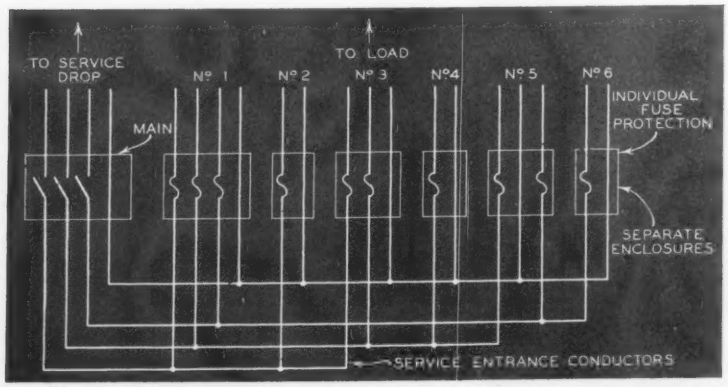



**Fig. 45. The new Code will permit the use of a main switch controlling six or less sets of fuses in separate enclosures, provided these are grouped at a readily accessible location.**

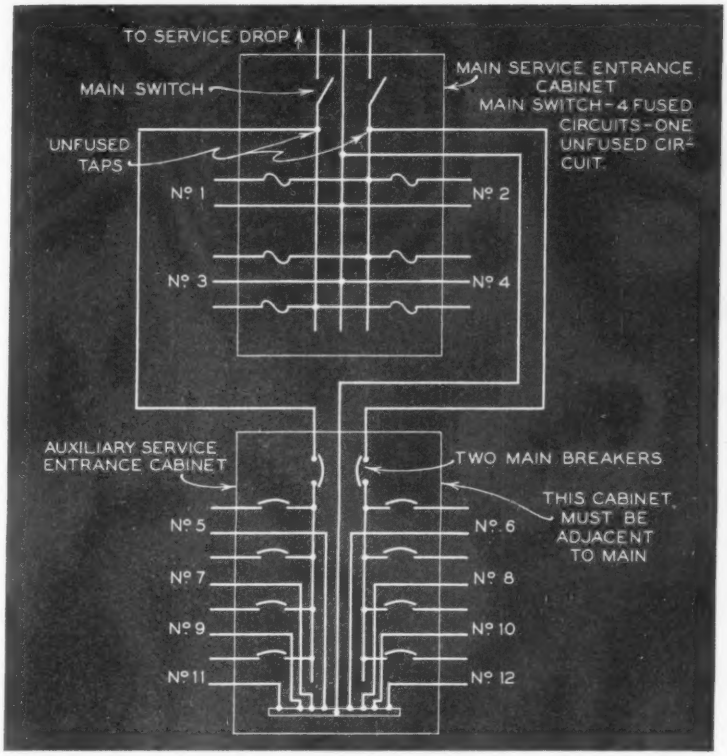



**Fig. 46. Here is an interesting variation in the rule for overcurrent protection. A four-circuit service entrance cabinet having two unfused taps is illustrated. Adjacent to the main cabinet is a second cabinet served from these unfused taps. It will be noted that there are only six main subdivisions of the service even though twelve branch circuits are being served.**

requirement of 200 kva per phase, so that any circuit up to 25,000 volts may have the above described service equipment.

The 1940 Code now requires (Section 2389c) that where fuses are used as combination disconnect and over-current devices as permitted on the 2500 to 7500 volt circuits discussed above, they must have an interrupting rating equal to the maximum short circuit current of the circuit. The National Electrical Manufacturers Association has set up the necessary standards for these cutouts and they are available as standard equipment.

## Five Year Program Extends Rural Lines

(*Continued from page 15*)

complaint registered about the installation or use of this type of wiring," reports P. C. Tucker, general sales manager of the Arkansas Power and Light Company. "We urged electrical contractors to use this type of wiring for several reasons," he said. "In the first place, use of this type of cable speeded up installation time, permitting the contractor to reduce labor costs and thereby increase profits. In the second place, because of the reduced labor costs, it has been possible to about double the number of outlets installed in each house, thereby doubling the load possibilities."

Promotion of this type of cable was carried on through close contact with the wiring contractors, Mr. Tucker said. In order to assist contractors obtain wiring jobs, lists of customers and prospective customers on all rural lines were furnished contractors at the time of, or just before, construction of the line was started. This enabled the contractors to visit houses along the route of the line and obtain contracts for wiring them.

Through the promotion of its rural electrification program, the company now has 11,894 rural residential customers and 2,349 rural commercial customers.

"Use of the protected neutral cable has unquestionably been of great assistance to us in our rural program," Mr. Tucker asserts. "There were one or two contractors who had to be sold on the use of this type of wiring at first, but not a single contractor who started using it was willing to change back to some other type. They found that it was easier to handle, faster to work with, and had many other benefits. We feel certain that we would not have been able to obtain as many outlets in the farm homes if this type of wiring had not been used. And from our standpoint, the number of outlets in our farm customers' home is a big factor, because it increases the possibilities of load building."

Mr. Tucker points out that the Arkansas Power and Light Company rural lines extend to all classes of houses, from log cabins to large stone structures.

### Cooperative Merchandising

In addition to the line building and wiring promotion programs, the Arkansas Power and Light Company has carried on a co-operative program with appliance dealers that has not only been beneficial to the dealers from the standpoint of sales, but has resulted in large load gains. In this program, a survey was made by employes of the company, who made personal calls on each rural customer. A complete list of all appliances, dates purchased, and condition, was compiled. This was sent to dealers in the sales territory, and served as a clear indication of the sales as well as servicing possibilities.

In addition, lists of new customers are supplied to dealers as they are connected to the lines. Salesmen for the power company notify dealers of prospective customers for all types of appliances. In addition, the company maintains a mailing department, with up-to-the minute addresses of all electric customers, and handles direct by mail advertising for all dealers, charging them only the postage required to get out their material. This not only lightens the advertising load of the dealers but assures them of a select mailing list.

Fixing collateral values of this program is easy because of the system of monthly reports of appliance sales made to the power company by dealers. During 1940, a total of about $7,000,000 worth of appliances (excluding commercial appliances) was sold in Arkansas Power and Light Company territory, and a large portion of these appliances went to residential customers.

# TO SELL WATER HEATERS-- FIRST SELL HOT WATER !

By Ward Warburton

"Modern styling fits this heater for kitchen or bath."

NEVER before in the history of the electrical industry, has there been so great a potential market for electric water heaters, nor a better opportunity to fill the demand. Water heater manufacturers have outdone all previous efforts in fitting their products to customers requirements and budgets.

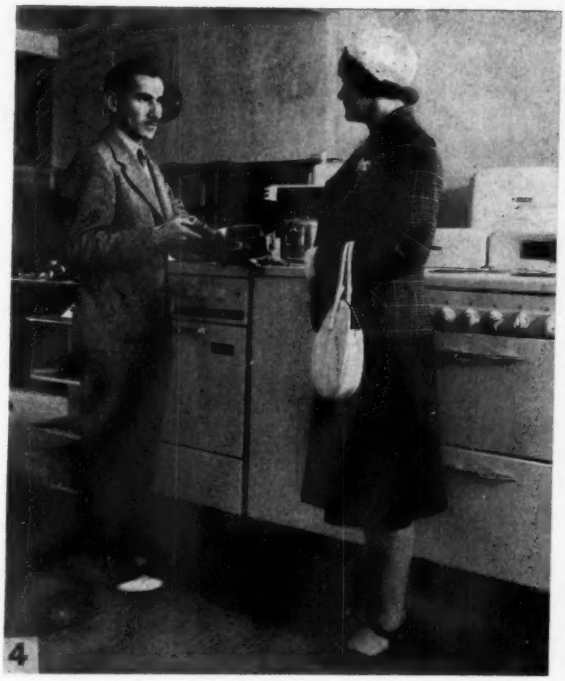
One of the South's most enthusiastic exponents of electric water heater selling is Ben Cooper, proprietor of the Ben Cooper Appliance Company, Miami, Florida. Regarded in Metropolitan Miami as an electric water heater "specialist", Mr. Cooper began his electric merchandising experience as a part-time salesman while still a student in a Philadelphia high school. Previous to going into business on his own account, he was connected with utility merchandising departments and with electrical appliance firms in several northwestern cities and in the Southwest.

"The dream of almost every housewife, who doesn't have it," says Mr. Cooper, "is a *plentiful* supply of hot water, awaiting the turn of a tap. It has been promised her so many times without the promise having been kept that in many cases she is skeptical.

"The salesman's job, therefore, is to convince

"This model is a space saver. It holds 30 gallons."

"Stepped-up temperatures solve guest problems."



"Table-top provides work space with small range."

"Increases work space when larger range is used."

her that the water heater he sells can deliver the goods, and to make sure that it does it.

"The word 'plentiful' is comparative. It must take into account the needs of the prospective purchaser's family, both as to size and water using habits. A hot water supply which will be adequate for one family may be insufficient for another that is no larger.

"Out of a lot of hard-won experience, my first step in water-heater selling is to find out definitely how much hot water my prospect really wants. Therefore, I ask questions: 'How many are there in the family?' 'Is laundry done at home?' 'Do you have full-time servants?'

"I want to know, too, what the family's bathing habits are but my own observation usually gives me a dependable clue as to that angle.

"Having fixed in my own mind the capacity of the heater this family should have, I determine where best the unit can be located. Today's styling of electric water heaters has gone a long way toward solving this problem. The types now available and their visible appeal make it possible to fit them into the ensemble of the most ultra-modern kitchen or bathroom.

"As soon as the questions of capacity and location are settled, I am ready to talk 'price'. I make it a fixed policy to include, in any quotation I give, the total cost of installation. While the customer is entitled to a 'break down' on my figures, I stress the point that I am selling a dependable source of hot water for the home and not merely a heater and plumbing bill.

"After an installation has been made, and the current turned on for a time sufficient for the water to heat, I check up to find out whether or not the heater is working as it should. Usually the answer is an enthusiastic "Yes!" But, as a

**Customer: "I'm interested. Will you call at this address and check our hot water requirements?"**
**(Shown in photos are Mr. and Mrs. Ben Cooper, of Ben Cooper Appliance Co., Miami.)**

rule, the new purchaser puts a high premium on our interest in making certain that he is getting the results we promised him.

"We find that a consistent and friendly con-

*(Continued on page 60)*

Gilbert Leach, Jr., left, Tampa Electric Company's commercial electric cooking salesman, demonstrates the economy and efficiency of the electric deep fat fryer as an "opening wedge" to acquaint his prospects with the advantages of electric cooking.

# "Opening Wedge" Sells Commercial Cookery

By L. H. Houck

"GREAT OAKS from little acorns grow" is one of the few truthful and reliable old adages still applicable to this age of streamlining and chromium plate. In this case the great oaks which subsequently came along were complete commercial electric kitchens and the little acorns were electric fry kettles.

But Gilbert Leach, Jr., commercial cooking engineer for the Tampa Electric Company, Tampa, Florida, doesn't call electric fry kettles acorns. He calls them "opening wedges."

Three years ago, Mr. Leach, not many years out of engineering college, his E. E. degree papers still white with youth, after experience in many other departments of the Tampa Electric Company, finally hung his hat up in the one-man commercial electric cooking department. At that time there was not a complete electrical kitchen in town and Tampa is essentially a town of restaurants, grill rooms, cafeterias and great and small eating places along the highways, patronized by the thousands of visitors to this area during the winter months.

After a thorough survey of the field, the new cooking engineer evolved a plan, using football strategy, which he calls the "opening wedge." Proof of its effectiveness is to be found in recent records of demonstrations of all types of commercial electric cooking equipment, which show sales of better than 80 per cent.

He selected the electric fry kettle as the most versatile and least expensive way of attracting the restaurant kitchen business. The Tampa Electric Company does not sell the equipment, it is only interested in the promotion of commercial cookery to increase the sale of power. Sales are made through cooperation with restaurant supply houses.

Mr. Leach, from a cold start, selected restaurants who could most profitably use the equipment and presented them with cost and installation details. He cited the efficiency of the fry kettle and its construction, which permitted use of the same fat over and over again, and offered to prove his points by installing one on trial. On trial tests the company ran temporary wiring and installed a meter. If the customer was sufficiently interested, the engineer showed him how to read the meter and check his own costs.

Thus restaurant men began to find out that the electric fry kettle is one of the most efficient and economical pieces of commercial cooking equipment. What is perhaps even more important, these operators learned that the cooked food from these kettles is incom-

**Typical of the results obtained with Leach's "opening wedge" is the complete electrical kitchens installed at the Tampa Yacht and Country Club. Despite the fact that the club had a splendid outdoor barbecue pit and grill, Mr. Leach was able to promote the use of this portable electrical grill for outdoor use at the Club.**

parable. Sales of fry kettles were almost 90 percent, that is, nearly every demonstration sold a fry kettle. Now, after three years, many of these customers have two and some as many as five of the kettles.

Production from fry kettles is astonishing to the uninitiated. For instance, one food service operator using this method of deep fat frying, has built up his output to nearly half a ton of French fried potatoes every day. Another customer cooks as many as a hundred chickens a day, while another specializes in seafood cooked in the fryer.

Such was the result of the opening wedge. With customers convinced of the efficiency and economy of electric cooking, there then began an almost endless changing to electric cookery. Sales included a variety of toasters, waffle bakers, hot plates, steak fryers, drink mixers, large griddles and coffee makers, to say nothing of electric ranges.

After three years, Mr. Leach has come to a number of conclusions which help to promote continued success in this line. Highly specialized service with trained maintenance men are important, if not well nigh indispensable. Restaurant electric equipment gets harder use and more abuse than similar equipment in domestic service, and it must be rugged and sturdy.

Untrained help used in some restaurants is a contributing factor in service calls on equipment, but this is well taken into account by the manufacturers of equipment.

The Tampa Electric Company believes successful promotion of commercial electric kitchens must be carefully planned and that unless the business can be improved by electric cookery and all factors point to a successful installation, it should be deferred until conditions are more favorable.

The commercial electric cooking engineer must not depend on the restaurant supply houses to keep abreast of the new services for restaurants. The department must keep up with the advances in this type of equipment, Mr. Leach said, and be ready to promote the new items that come on the market. At the Tampa Electric Company this has been done in a number of cases even before the supply houses had stocked the new devices.

Prompt engineering and installation data helps sales and this is supplied for every prospect.

The thorough combing of the territory and the many sales of fry kettles has taught the wideawake and progressive restaurant operators that the quickest way to find out about new equipment is to call the local utility cooking engineer. Many requests are now received for special equipment and the department is always busy on specially designed jobs for use in commercial electric cookery.

New restaurants and new road-

*(Continued on page 64)*

**Here are just a few of the many commercial kitchens in and near Tampa which boast of electrical cooking equipment of one kind or another, from a single deep fat fryer to a complete electric kitchen. Remarkable fact about Tampa's electric commercial cooking campaign is that 80 per cent of all demonstrations have resulted in sales.**

# Appliance Dealer Problems from the Jobber Salesman Viewpoint

THE appliance dealer can learn a lot about his competition from the jobber salesman—and a few things about himself, too, for that matter. An analysis of various types of electrical dealers, the points which appeal to each, and a few of the reasons why they should look upon the jobber salesman as an effective partner in their business are given by Charles W. Lynn, veteran salesman of the Birmingham Electric Battery Co., refrigerator distributors for Alabama and West Florida.

Numbered among his dealers are those in the furniture, the hardware, department store and the automobile business. However, 60 per cent of his outlets are pure appliance specialty stores. Even a few are druggists and grocers.

"Of these the furniture store is perhaps the hardest to sell," said Mr. Lynn. "This type of dealer figures the markup pretty closely, and since it doesn't run quite as much as on most furniture items, he is hesitant in taking on the refrigerator line.

"My plan in selling the furniture dealer is to stress profits. This can be more easily done by citing actual figures. Suppose he lays in a $2,000 floor stock on the usual financial plan, paying 20 per cent down or $400. The chances are that he can sell $400 worth of merchandise in 30 days, or the equivalent of two refrigerators, probably even more. If he does, he has in effect made 100 per cent on the investment. This sounds better to the dealer than the 30 to 40 per cent discount which the merchandise carries.

"But there is still another argument that appeals to a furniture dealer. If he has been in business for a long period, he has numerous accounts which he values very highly. If he does not carry appliances, then he is sure to let some of these accounts get into the hands of other dealers.

"I recall the case of one furniture dealer who steadily refused to stock radios. So many jobber salesmen called on him trying to get him to put in a radio line that he became irritable, threatened to throw out the next one to call. It was my luck to call on this dealer. He immediately became abusive. I became angry myself and after saying "Thunder, if you want to keep on losing accounts, it is all right with me," I walked out.

**By Geo. H. Watson**

"Apparently this dealer had not thought about losing his accounts which he treasured highly. I judge he thought about the subject quite a bit for it wasn't long before he telephoned for me and put in my line.

"Since the hardware dealer does not go in for outside selling, being more or less by nature a commodity order taker, I stress to him the ease with which electrical appliances may be sold. I have even gone so far as to guarantee the turnover of the first merchandise put on his floor. In such cases, I was mighty careful to give him fast selling items and in a few cases I went out and sold the merchandise or at least worked with the dealer.

"The case of the department store is somewhat like that of the furniture store in that it has thousands of accounts on its books which it values highly, so here again I stress the value of appliances as a builder of accounts. Also, the department store, even in the small city, likes to think of itself as handling everything from soup to nuts. This type of coverage would have to include the electric line.

"The automobile dealer in one sense should make a fine outlet for major appliances, since he has a setup for outside selling, and such is often the case. Yet the automobile manufacturers are pretty hard taskmasters, expect a maximum of performance on their products, so this may not leave much time for appliances. In a few cases, I have been able to wean dealers away

**Charles W. Lynn, right, veteran jobber salesman with the Birmingham Electric Battery Company, who presents some interesting comments in the accompanying article on types of dealers he encounters, is shown "signing one up." However, for the benefit of the record it must be admitted that the "customer" is no dealer at all, but Mr. Lynn's sales manager, W. C. Steele.**

from automobiles and get them in the appliance business.

"The pure specialty dealer still accounts for 60 per cent of my volume which has run as high as $630,000 per year. Most such dealers have the advantage of having learned the business from the ground up. They go in for outside selling by necessity. I do not agree with the view of some distributors that the specialty dealer's days are numbered, that appliance selling as it is more standardized will become an over - the - counter business, handled mostly by the department and furniture stores. While the saturation is pretty high on refrigerators, the field for outside selling of ranges, water heaters and home laundry equipment is wide open.

"Occasionally, I run into a hard-boiled dealer prospect, who doesn't believe any money can be made in the appliance business. He can point to Mr. Jones and Mr. Smith in his own town who went broke in the business. My reply is that back during the lush years, a few poorly financed dealers did get into the business, but that the finance companies have tightened down considerably on the requirements, and that if he became a dealer today he would be in more select company.

### Establishing New Dealers

"Sometimes when a dealer cannot be located among the established stores, then one has to be created. I recall an instance in one Alabama town where the utility had the appliance business by the tail and dealers were afraid to try it. I found a young man who had lost his leg in a football game in the town. He was highly regarded and had a sympathetic following. We set him up in business and today he has practically all of the appliance business in his locality.

"While the matter of getting new dealers is important, so is that of holding old ones. The latter constituted a big part of my job during 1938 when sales dropped off and collections became difficult. Now that sales have improved, I am glad that so many of our dealers pulled through. This required close work with them, both by my office and with the finance companies. At times the temptation was to cut them off, but where would that have left us? We would have been without a dealer in that territory, right back where we started. It would have meant that we would have had to go all over the process again of finding a dealer and then helping him get started.

"While speaking of salesmanship I would like to say something also about what has been called 'buymanship' or just the opposite of salesmanship. Some dealers seem to look upon a salesman as a pest instead of an expert or a sort of traveling sales research laboratory. They let the salesman cool his heels in the outer office when they should go out and greet him with open arms.

"Salesmen in their true role are teachers, have many facts tucked away in their minds and bags, yet so often they are not urged to bring them out. In fact, salesmen are often put on the offensive from the start, and if they ever get around to the point of presenting savings and earnings, it is only after running the gauntlet of emotional friction which destroys their effectiveness.

"The average salesman gets around a lot. He calls on other dealers, he contacts the finance company, he knows what the home office is thinking, so the dealer who does not draw him out is, to say the least, missing an opportunity. I am glad to say that this type of dealer is in the minority. Most dealers are glad for the jobber representative to come around, often suggest that he address the whole sales force. To such a dealer, the jobber salesman is a partner in the business, and the benefits are mutual."

**"Good morning, Mam. I'll be glad to demonstrate our new coffee maker if you have some coffee—and coffee cake."**

### Restaurant Owners Find Roasters Profitable

While homemakers everywhere are taking the new electric roasters to their hearts, and kitchens, because of their economy, efficiency, and convenience, appliance dealers in Texas have discovered that the roaster holds great profit possibilities for restaurants.

One dealer at San Benito, Texas, reports a restaurant operator as saying, "We use our electric roaster the full twelve hours we are open for business for cooking barbecue. At night we use it for baking ham. We find it the most economical way to cook meat because shrinkage is reduced from ten to twenty per cent in comparison to ordinary oven roasting. We also find that after the barbecue is thoroughly cooked it will stay hot from two to three hours without additional heat, thus saving additional expense for reheating while the barbecue is being sold."

Another dealer at Mission, Texas, reports that a restaurant roaster customer has pointed out that the most important advantage of the roaster is the time saved because of the automatic temperature control. He also points out that the roaster takes up very little space, is easy to clean and is a beautiful piece of equipment.

Roaster salemen may find these reports suggesting profitable sales opportunities in their territory.

# Expanding Use of Refrigeration In Southern Industries

By T. H. Eakle, Jr.

**Assistant Manager, Industrial Refrigeration Division, York Ice Machinery Corporation**

A COMPLETE study of the important part refrigeration plays in even a few major industries would require volumes and interest only those engaged in the specific industry. A brief review, however, may lay the foundation for the solution of similar problems in other plants even though the process or product is entirely different.

For this analysis the petroleum processing, tire manufacturing, whiskey distilling, carbonated beverage bottling, textile and chemical processing industries furnish the best examples of applied refrigeration as an indispensable requirement of the processing industry. Such plants in the South are particularly good examples because of their comparatively recent growth, using up-to-date equipment and the latest developments in processing.

### Oil Refinery

"Temperature", the processing tool of the oil refinery, as used in the early history of the industry had only one significance — high temperature. Heat was applied in various parts of the cycle to breakdown the crude oil into its component parts, such as: lubricating oil, kerosene, and gasoline. These products would gradually cool down to surrounding temperatures as they were held in storage. Thus, the air was the cooling medium.

The lubricating oil produced was used in axle grease, steam engine and similar applications. The cold weather of mid-winter caused the oil to stiffen on the outdoor engines resulting in wear due to lack of lubrication and requiring an excessive amount of power to operate. The logical solution was to further refine the oil to remove the ingredients which caused the stiffening action.

Wax was found to be the offender. Various means were devised for its removal involving settling, filtering, and cooling to as low a temperature as possible with available well water.

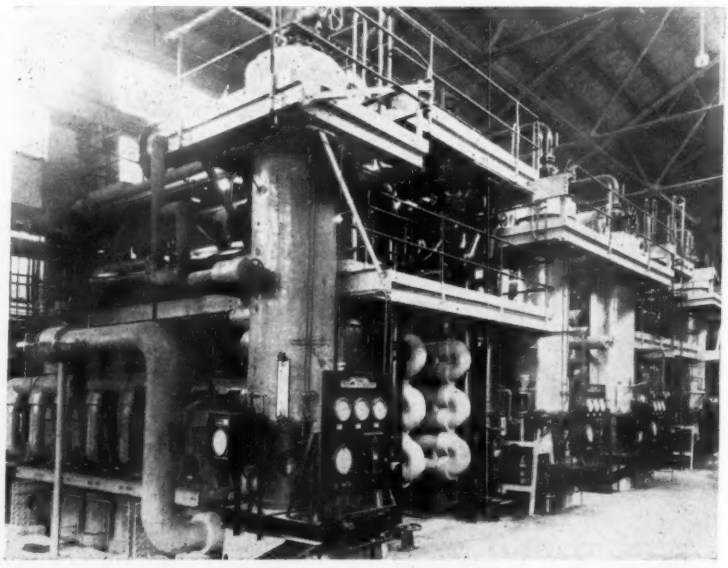
This satisfied the requirements for a few years. But, soon new high speed precision engines in automobiles, aeroplanes and countless other applications were requiring a better refined lubricating oil with less wax and other gummy substances. Still more filters were added to the petroleum processing cycle. More well water was used. Cost of production increased but the wax remaining still exceeded desirable limits.

Low temperatures answered the problem. Refrigeration, by chilling the oil to lower temperatures than will ever be encountered in use, amplified the previous treatment and the wax is now removed economically, rapidly, and under accurate control so that the same results are secured winter or summer.

The process, of course, is highly complicated with several excellent cycles available for use with oil of any characteristic. Basically, however, the use of refrigeration is necessary to all of these, requiring the chilling of a mixture of oil and solvent with a mechanism that continuously scrapes the accumulating wax off of the heat transfer surface.

Dewaxing is just one of many processes using refrigeration in the refining of oil. Sulphur is removed from gasoline to give a better product. Here an acid reaction with the gasoline removes the sulphur but in doing so generates heat that must be removed as it forms in order for the process to take place. Low temperature again furnishes the answer by refrigerant evaporation in small tubes directly surrounded by the solution of acid and gasoline.

The huge Port Arthur, Texas, plant of the Gulf Oil Company uses 350 tons refrigeration in removing the sulphur from 12,000 barrels of gasoline per day. A York ammonia compression system is applied to this duty.

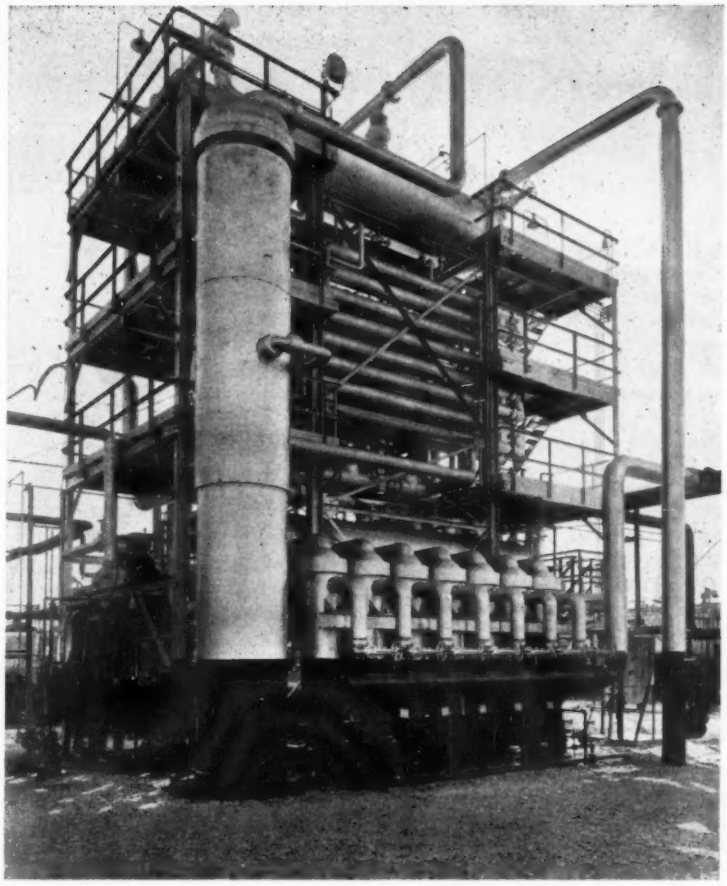


**Typical installation of an absorption refrigerating system of the indoor type applied to the chemical industry. This plant contains four units with a capacity of 350 tons of refrigeration each. The total cooling capacity is equivalent to the melting of 2,800,000 pounds of ice every twenty-four hours. The installation is in one of the E. I. DuPont de Nemours plants.**

New refining processes requiring refrigeration are being developed daily. "Alkylation," one of these very new systems, permits recovery of high octane gasolines from what was once refinery waste gases. The Shell Oil Company has just installed the newest plant of this type at Deer Park, Texas. It includes a 700 ton refrigeration ammonia absorption system of a new and efficient design. This is a complete outdoor installation without any type building to enclose the mechanism from the elements.

Conservation of natural resources in gas distillate fields is leading to a new setup in the oil refinery cycle and again refrigeration plays its part. This new development is known as a recycling plant. Here refrigeration is used in the recovery of condensate from gas distillate wells, after which the gas is pumped back to the well. Heretofore the general practice for distillate recovery from such gas distillate wells was to drop the pressure from the well head pressure and either waste the gas, or in those cases where there was a market, to sell the gas. The recovery of condensate depended entirely on the drop in pressure. The result of such operation was a continually decreasing recovery, since many of the condensibles dropped out in the well as the well pressure was reduced. The condensate so lost is not recoverable.

Conservation laws are preventing such operation and production from these wells has been limited to those cases where there is a market for the gas. In the recycling plant, the gas from the gas distillate well is processed under high pressure, and the well pressure is maintained by returning the dry gas to the well after processing. Refrigeration requirements vary depending upon the initial gas pressure, the pressure, under which the processing is carried out, the drop in gas pressure permitted during processing, etc.



**This 700-ton ammonia absorption refrigerating system of the outdoor type was recently installed at the Deer Park refinery of the Shell Oil Corporation, Deer Park, Texas.**

### Tire Manufacture

The story of rubber from the tree to the finished product has been told and retold in highly technical articles as well as grade school texts. The process of tire manufacture also has a popular appeal as was indicated by the crowds visiting the New York World Fair exhibit of the Firestone Tire and Rubber Company in which tires were produced under the astonished eyes of the public.

Not spectacular, and consequently seldom noticed in all of this publicity, is one small step requiring huge quantities of refrigeration. Cold water produced with this refrigeration has saved the industry huge sums of money and provided steady summer employment for thousands of persons, by permitting continuous production regardless of weather conditions.

Large blocks of crude rubber are carried through rollers in this one "curing" process. The block is half foot in thickness as it enters the rolls which compresses it to a fraction of an inch. It springs out to a foot or more in thickness as it emerges from the roll. The heat developed, due to friction, and the compressing action is tremendous and essential to the process. But, if unchecked, the temperature becomes excessive resulting in forming a sticky mass of rubber that adheres to the rolls, stopping production or imparting undesirable characteristics to the product. This condition was particularly noticeable on hot, humid days before refrigeration was applied.

Now cold water circulates through the rolls, removing just sufficient heat to keep the temperature of the rubber as it leaves the rolls at the most desirable point. No longer is it necessary for thousands of employees to go home and wait for cooler weather during portion of the summer. No longer must the rubber industry wonder if each successive block will be slightly different due to the gradually changing temperature of the rolls.

### Whiskey Distilling

Only recently has mechanically produced cooling been connected with the time honored profession of Bourbon distilling. Now a dozen plants in Kentucky alone are reap-

*(Continued on page 64)*

# Distribution System Economics

## *Part 4—Distribution Substation Design*

By P. E. Benner

Central Station Department
General Electric Co.

THE distribution substation is economically related to the feeder circuits in much the same manner as the distribution transformer is to its secondary circuit. A simple statement of the cost per kilovolt-ampere of a substation is therefore of no significance, unless the associated investment in primary feeder circuits is known.

Even neglecting the matter of feeder investment, several widely divergent per-kva costs can be loosely ascribed to the same substation. The lowest cost would be obtained by using the kva of installed capacity as a base. If the kva of firm capacity is used instead, a higher figure would be obtained, and if the substation is evaluated on the basis of actual load carried, the figure would be still higher.

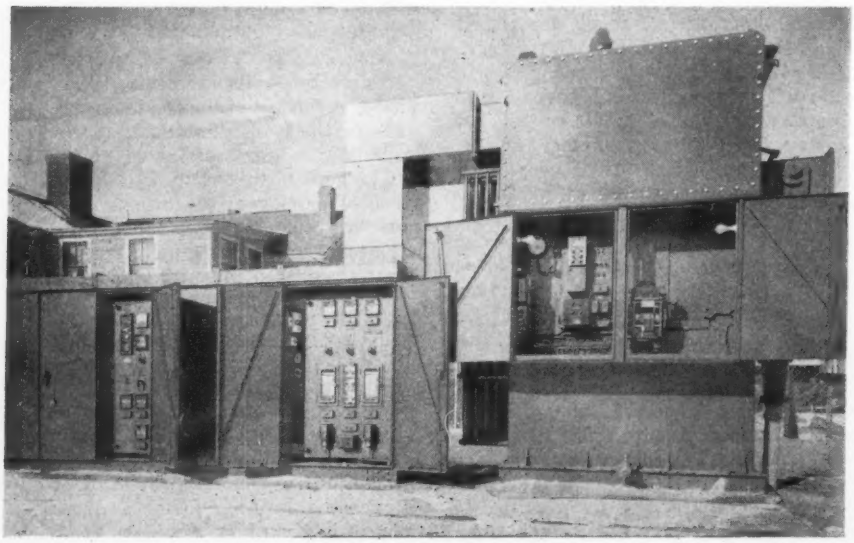
The cost per kva of load carried is of primary interest, and it is particularly important that this figure be used in comparing primary systems, one of which is more conducive to a higher average substation loading than the other. It would appear logical to expect that small substations would have an appreciable advantage from the standpoint of loading over larger sized stations, because of the fact that the substation capacity is added in smaller increments and therefore involves less forecasting. In comparing various sizes of conventional radial substations, a lower cost per kva resulting from this difference in loading might be more than offset by the higher cost per kva of the small over the large substation. However, it should also be remembered that the small substation, in addition to being conducive to higher average loading, also reduces the length of feeder circuits, and correspondingly the primary loss in the system.

One of the important causes of the higher cost per kva in small substations is the cost of providing duplicate high voltage supply circuits. The primary network system utilizes the interconnected primary circuits themselves for providing the necessary reserve capacity and thus eliminates this handicap of small capacity substations.

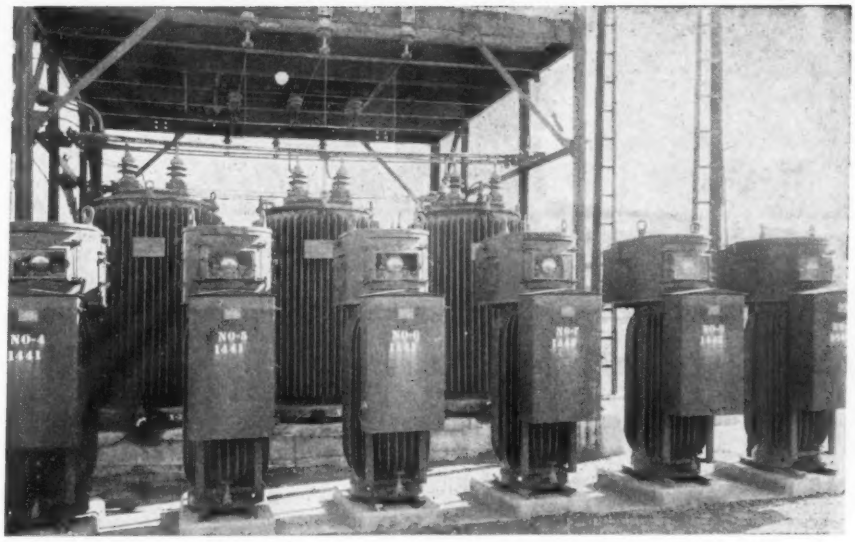
### Bus Regulation

The small substation when used in a primary network system has a considerable economic advantage in the matter of voltage regulation. The voltage drop from substation to the furthest distribution transformer can be kept readily to a low value; that is, within the limits of 2% to 3% because of the fact that each substation is located at the load center of the feeder area being served. Also, in the primary network system, the load per breaker is one half or less of what it would be in a corresponding radial system to serve the same area, and in addition, the feeders are double ended; that is, fed from either end, which is of material help in minimizing the effect of unbalanced 3-phase loading. For these three reasons, it is possible to use 3-phase bus regulating equipment which can be economically built into the transformer itself.

Because of the lower cost of this type of equipment, that is, the load ratio control transformer, there is a strong temptation to use it in the larger radial substations. Such a design will result in a very low cost per kva of substation capacity, but in the final analysis, when the cost of feeders necessary to distribute the power with a maximum drop of 2% to 3% from the sub-



**Primary net work substation using bus regulation. Bus regulation is economically feasible for 1500 to 5000 kva primary network substation because feeders are double ended and carry only about half as much load per breaker as a conventional radial substation.**



**Radial substation having individual feeder regulation. This type of regulation is necessary to economically take care of variations and unbalance in feeder loading and voltage drop in large multi-circuit radial substations.**

station bus to the furthest transformer is added in, the total investment is much greater than for either a conventional radial substation utilizing individual feeder regulation, or a primary network system in which the combined transformer and regulating equipment can be economically employed.

In calculating the voltage drop from the substation bus to the furthest transformer, it is important to take into account the effect of unbalance in the three-phase feeders. For instance, a normal amount of unbalance of the order of 20% will increase the voltage drop on the heaviest loaded phase in the order of 15% over what would be obtained for balanced conditions. To compensate for this extra drop in a six-feeder substation would require the addition of another feeder circuit.

For estimating purposes, the per cent increase in drop in the heaviest loaded phase due to unbalance can be taken as equal to ¾ of the per cent unbalance, where the unbalance is defined as the per cent which the largest line current exceeds the average of the largest and smallest line currents.

### Substation Reliability

The degree of reliability built into a substation has a very important effect on the overall cost per kva. In a radial substation the greatest reliability would be obtained from a design which would permit the loss of a high voltage transmission circuit or a substation transformer bank without interrupting service on any feeder, and in addition would provide for servicing all circuit breakers and regulating equipment without interrupting service. In this connection, it might be noted that for such an arrangement the lowest cost per kva for transformer bank and transformer breaker is obtained by using the minimum number of banks possible as limited by the capacity of incoming circuits. In other words, to provide a firm capacity of 5000 kva, two 5000-kva, 3-phase transformers with their associated secondary breakers would be cheaper than three 2500-kva transformers with their associated breakers.

If the substation is to be designed so that a transformer failure will cause a service interruption, some saving may be affected by using single-phase transformers, providing the additional cost of high-side breakers over low-side breakers does not exceed the saving from the use of single-phase transformers. A still further reduction in cost and reliability would be obtained by not providing any spare transformer capacity on the premises, but depending on an actual physical replacement of a transformer in case of failure.

### Substation Location

In selecting a substation location, it is important to include in the comparative cost not only the cost of the substation site, but also the cost of the feeder circuits and the capitalized losses in these feeder circuits from substation site to the load centers of the feeder areas. When proper consideration is given these last two factors, it is frequently found economical to locate the substation much closer to the theoretical load center of the substation area, than if the only consideration is the actual cost of the real estate.

### Summary

To insure the lowest possible investment in the distribution primary system consistent with good service requires the careful consideration of substation facilities along the following lines:

1. The b a s i s of comparison should be the cost per kva of load carried so as to give the deserved preference to designs conducive to higher substation loading.
2. The cost of the substation should not be considered independent of the feeder circuits necessary to distribute the load, as savings in substation costs may be more than offset by increased feeder expenditures resulting from such changes.
3. There are several different degrees of reliability which can be designed into a substation, and in making a comparison between several different layouts or systems the degree of reliability should receive careful consideration.
4. Other things being equal preference should be given to a system which permits adding capacity in smaller rather than large increments, and which is most adaptable to meet changing conditions of loading.

(*This fourth article concludes the series. Copies of the three preceding articles are available upon request.*)

MOTOR Service

# Connecting Diagrams for Lap Wound A-c Motors

By A. C. Roe

Railway Motor Engineer
Westinghouse Electric & Mfg. Co.

WITH this article are presented the ten pole, three phase, ten parallel star and delta, three lead, connecting diagrams which complete the ten pole series. In addition, the discussion on voltage changes is continued.

A ten pole, ten parallel star, three lead, three phase diagram is shown in Fig. 53. This connection has four rings, as the end of each pole phase group is connected to the star ring. Thus pole phase group jumpers are eliminated.

The other three rings, for the A, B, and C line lead connectors, each has ten connections made to it, whereas the star ring has thirty connections attached to it.

To convert a ten parallel star to a ten parallel delta connection is a simple procedure, as it is only necessary to eliminate the star ring of Fig. 53. By referring to the schematic diagram of Fig. 54, we find that the end of the A phase connects to the C phase, etc.

We then cut off the star connections of groups 1, 4, 7, 10, 13, 16, 19, 22, 25 and 28, and reconnect them to the C ring. Next disconnect the star connections from the end of all C phase groups, numbers 3, 6, 9, 12, 15, 18, 21, 24, 27, and 30, and reconnect these to the B ring. Then disconnect the star connections from the ends of the B phase groups, numbers 29, 2, 5, 8, 11, 14, 17, 20, 23, and 26, and reconnect these to the A ring.

In actual practice, a complete diagram is not required to change from ten parallel star to ten parallel delta. All we need is the small schematic diagrams. We can then pick any one pole phase group and call it A-1, disconnect its star connection, then connect over clockwise, facing lead end, to a group No. 3. This will be the C phase. Trace out the lead ring and connect the star connection from the A-1 group to this ring, with two rings marked A and C. The rest is a simple matter; using the A-1 group as a starting point, pick up group 4, 7, etc. After that, we can start on the C phase group No. 8 and disconnect the star jumper and attach it to the B ring, etc.

The ten pole, ten parallel, delta, three phase, three lead diagram is shown in Fig. 54. This has only three rings, with twenty connections to each ring. With a delta connection, the direction arrow on each pole phase group is a check on the phase indentity, as the current is assumed to flow in on all phase leads. Thus, on group 1, the A indicates an A phase group, etc. In this way, any existing connection can be readily identified.

To convert the ten parallel delta to a ten parallel star connection, we add another ring. Then starting at any group, we call it No. 1 and pick up one ingoing lead. Calling this the A ring. Then disconnect the end of the group and connect it to the star ring. Continuing in a clockwise direction, take group No. 2 and connect its outgoing lead to the star ring, and continue around the winding in the same manner.

### Calculating Voltage Changes

We can use Table No. I of the preceeding article (it is reproduced again with this article) to check the effect on the line voltage with a change from star to delta.

Assume that we have a 6 pole, 550 volt winding connected series

**Table I—Multiplying Factors for Reconnection of Three-Phase Motors for Different Line Voltages (4 to 12 Poles)**

| Original Connection | MULTIPLYING FACTORS TO OBTAIN NEW VOLTAGE FOR RECONNECTION | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Series | | 2 Par. | | 3 Par. | | 4 Par. | | 5 Par. | | 6 Par. | | 8 Par. | | 10 Par. | | 12 Par. | |
| | Star | Delta | Star | Delta | Star | Delta | Star | Delta | Star | Delta | Star | Delta | Star | Delta | Star | Delta | Star | Delta |
| Series Star | 1.00 | .58 | .50 | .29 | .333 | .193 | .25 | .145 | .20 | .116 | .167 | .096 | .125 | .0725 | .10 | .058 | .084 | .048 |
| Series Delta | 1.73 | 1.00 | .865 | .50 | .576 | .333 | .432 | .25 | .346 | .20 | .289 | .167 | .216 | .125 | .173 | .10 | .144 | .084 |
| 2 Par. Star | 2.00 | 1.16 | 1.00 | .58 | .666 | .386 | .500 | .29 | .40 | .232 | .334 | .193 | .25 | .145 | .20 | .116 | .167 | .097 |
| 2 Par Delta | 3.46 | 2.00 | 1.73 | 1.00 | 1.152 | .666 | .865 | .50 | .692 | .40 | .578 | .334 | .432 | .25 | .346 | .20 | .288 | .167 |
| 3 Par. Star | 3.00 | 1.73 | 1.50 | .865 | 1.00 | .577 | .75 | .435 | .... | .... | .500 | .288 | .... | .... | .... | .... | .25 | .145 |
| 3 Par. Delta | 5.19 | 3.00 | 2.60 | 1.50 | 1.73 | 1.00 | 1.30 | .75 | .... | .... | .865 | .500 | .... | .... | .... | .... | .432 | .25 |
| 4 Par. Star | 4.00 | 2.32 | 2.00 | 1.16 | 1.33 | .772 | 1.00 | .58 | .... | .... | .66 | .386 | .50 | .29 | .... | .... | .33 | .193 |
| 4 Par. Delta | 6.92 | 4.00 | 3.46 | 2.00 | 2.30 | 1.33 | 1.73 | 1.00 | .... | .... | 1.15 | .66 | .865 | .50 | .... | .... | .577 | .33 |
| 5 Par. Star | 5.00 | 2.90 | 2.50 | 1.45 | .... | .... | .... | .... | 1.00 | .58 | .... | .... | .... | .... | .50 | .29 | .... | .... |
| 5 Par. Delta | 8.65 | 5.00 | 4.32 | 2.50 | .... | .... | .... | .... | 1.73 | 1.00 | .... | .... | .... | .... | .865 | .50 | .... | .... |
| 6 Par. Star | 6.00 | 3.46 | 3.00 | 1.73 | 2.00 | 1.15 | 1.50 | .87 | .... | .... | 1.00 | .577 | .... | .... | .... | .... | .50 | .29 |
| 6 Par. Delta | 10.38 | 6.00 | 5.19 | 3.00 | 3.46 | 2.00 | 2.60 | 1.50 | .... | .... | 1.73 | 1.00 | .... | .... | .... | .... | .29 | .50 |
| 8 Par. Star | 8.00 | 4.64 | 4.00 | 2.32 | .... | .... | 2.00 | 1.16 | .... | .... | .... | .... | 1.00 | .58 | .... | .... | .... | .... |
| 8 Par. Delta | 13.84 | 8.00 | 6.92 | 4.00 | .... | .... | 3.46 | 2.00 | .... | .... | .... | .... | 1.73 | 1.00 | .... | .... | .... | .... |
| 10 Par. Star | 10.00 | 5.80 | 5.00 | 2.90 | .... | .... | .... | .... | 2.00 | 1.16 | .... | .... | .... | .... | 1.00 | .58 | .... | .... |
| 10 Par. Delta | 17.30 | 10.00 | 8.65 | 5.00 | .... | .... | .... | .... | 3.46 | 2.00 | .... | .... | .... | .... | 1.73 | 1.00 | .... | .... |
| 12 Par. Star | 12.00 | 6.92 | 6.00 | 3.46 | 4.00 | 2.30 | 3.00 | 1.73 | .... | .... | 2.00 | 1.15 | .... | .... | .... | .... | 1.00 | .57 |
| 12 Par. Delta | 20.76 | 12.00 | 10.38 | 6.00 | 6.92 | 4.00 | 5.19 | 3.00 | .... | .... | 3.46 | 2.00 | .... | .... | .... | .... | 1.73 | 1.00 |

star and we want to use the winding on 110 volts. This is a reducing multiplier of 110/550 or .20; then in Table I we find .20 under 5 parallel star but we can't use this on six poles. But under 3 parallel delta we find .193 which would reduce the line voltage required to 550 x .193 or 106 volts, which would be satisfactory.

Thus to find a possible delta connection, we divide the new line voltage by the old and use this as the factor in Table I. But in general, a change from a star to a delta connection is used where operation is required on a lower voltage, as a study of Table I will indicate.

When operation on a higher voltage, within the winding insulation range, is required, the change from a delta to a star connection might in some cases provide the proper conditions.

For example, consider a 6 pole, 220 volt winding connected 3 parallel delta, that we want to operate on 550 volts. The finding factor is 550/220 = 2.5. Then in Table I, on the 3 parallel delta line, we find 2.6 under 2 parallel star. This would indicate 220 x 2.6 = 572 volts which is quite satisfactory for 550 volt line voltage.

Or consider a 220 volt, 6 pole motor, connected 4 parallel delta that we want to operate on 550 volts, in this case the finding factor is 2.5 but in Table I, on the 4 parallel delta line, the nearest finding factor is 2.3 under 3 parallel star which gives 220 x 2.3 = 506 volts. This, too, would be satisfactory for 550 volt operation.

Thus the two tables in the preceding two articles can be used to solve many simple voltage changes. The next article will discuss designing new windings for different voltages when reconnecting is not possible. It will also include the first of the 12 pole diagrams for three phase star and delta connections.

---

## Effective Removal of Old Motor Insulation

To rewind an electric motor properly it is first necessary to remove completely the insulation material from the slots in both the rotor and stator. This is usually accomplished by means of knives, files, scrapers, and motor-driven sanding wheels. Depending upon the size of the motor, the operation may require the services of an experienced mechanic for anywhere from 2 to 10

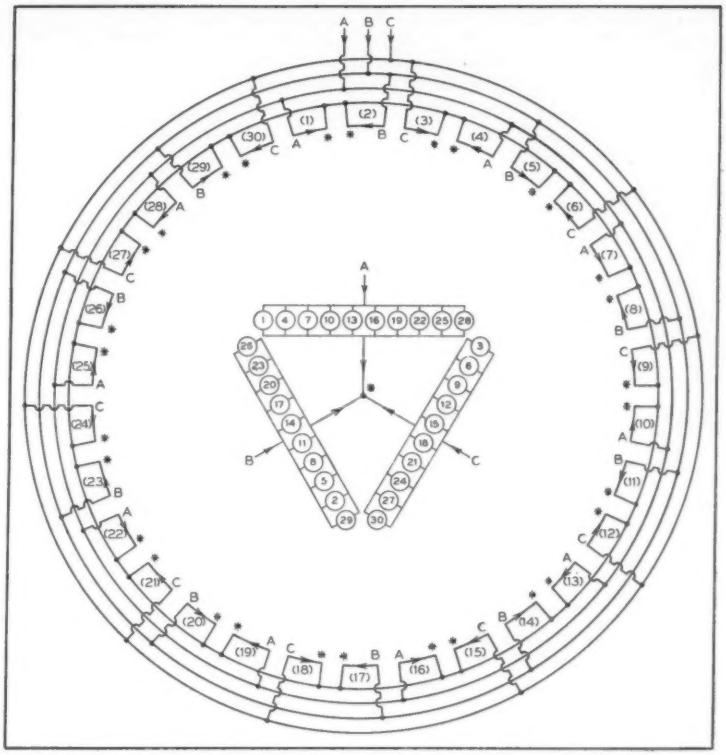


**Fig. 53. Ten-parallel star connection for 10-pole, three-phase, lap-wound induction motor with three leads.**

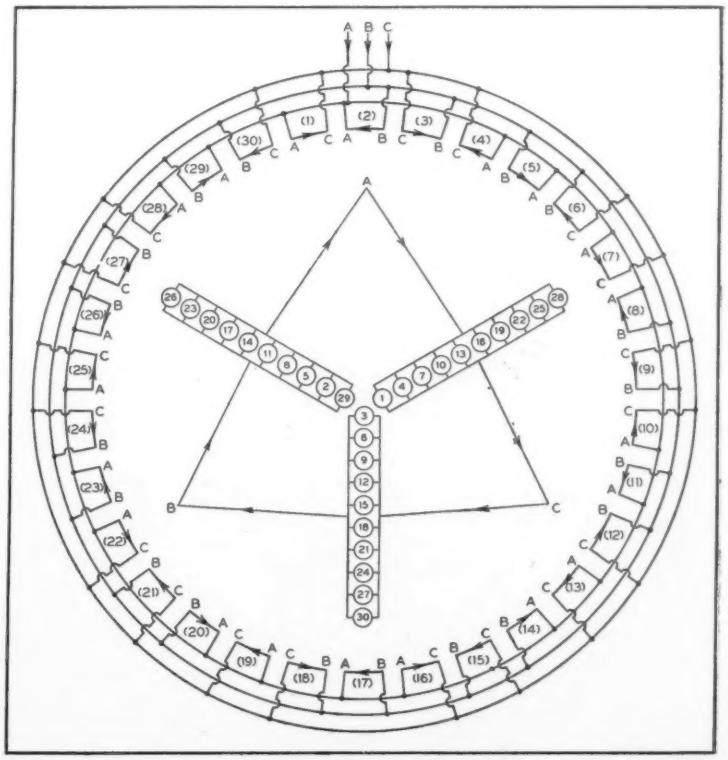


**Fig. 54. Ten-parallel delta connection for 10-pole, three-phase lap-wound induction motor with three leads.**

hr. for cleaning the slots of a single armature. Moreover, even with this variety of tools, the results obtained often are not entirely satisfactory because all of the paper cannot be removed by this method. Any insulation remaining in the slots interferes with replacement of the motor windings.

As a result of frequent rush orders, one repair shop recently found it necessary to develop some faster means of doing this work. The procedure they now employ should be of interest to workers in practically all electrical repair shops and electrical maintenance departments in industrial plants for it is not only faster, but also simpler and more efficient than that previously used.

Of the simple equipment required for this operation, the inexpensive decarbonizing blowpipe is probably the only piece not already available in most shops. The function of this blowpipe is to provide an easily controlled stream of oxygen. As shown in the accompanying illustrations, it consists of a handle, valve, and long copper tube or stem. Other equipment needed is a small air-acetylene torch, supplies of oxygen and acetylene, and suitable regulators and hose.

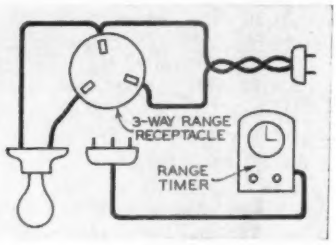
After the motor has been taken apart and positioned so that the rotor or stator slots are readily accessible, the air-acetylene flame is used as a pilot to start combustion of the insulating material at the end of one of the slots. As the paper begins to burn, the stem of the decarbonizing blowpipe is inserted in the slot and the blowpipe valve is opened. The air-acetylene torch is then withdrawn and the decarbonizing blowpipe is moved slowly along to the other end of the slot. Thus, the combustion of the paper and other insulating material is supported and hastened by the stream of oxygen, directed by the blowpipe. The oxygen is supplied through a ¼-in. hose at a pressure of 3 lb. per sq. in. Burning by this method is so thorough that no additional cleaning of the slot is necessary.

Jobs which previously required from 4 to 8 hr. are now completed in 20 to 30 min. by means of the decarbonizing blowpipe. Naturally the time element depends upon the size of the motor and the condition of the insulating material. Motors ranging in size from ¾ hp. to 3 hp. can easily be cleaned in 20 min.

(*Reprinted through the courtesy of Linde Air Products Company.*)

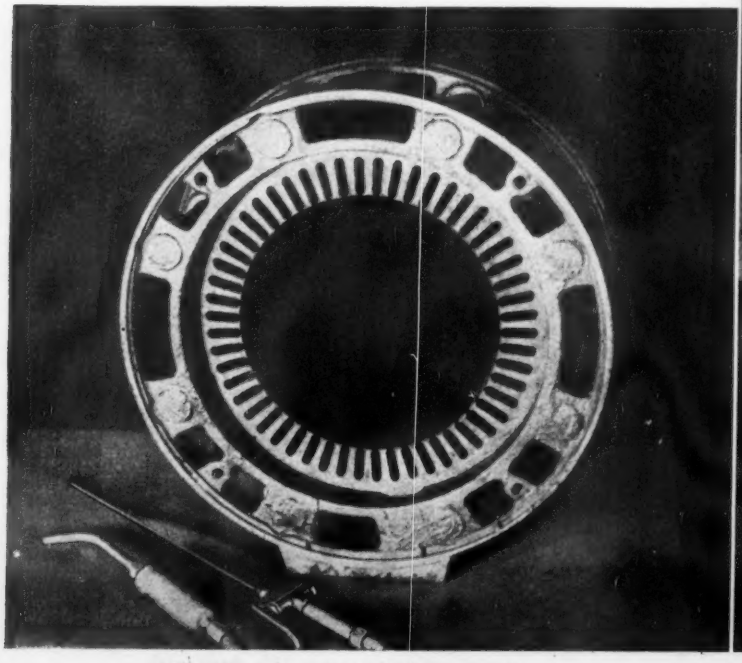
## Testing Range Timers

The testing of range timers can be very much simplified and easily made without the use of a range by the use of a simple testing device that can be quickly made up in any shop. The main requisite is a three-prong receptacle, as used on the range, to receive the three-prong plug of the timer. Also needed are




a sign receptacle or any type receptacle with a lamp to match, a few feet of lamp cord, and ordinary attachment plug. They are connected as shown in the diagram. The attachment plug is then plugged into a live receptacle and when the timer plug is inserted into the timer receptacle, the timer will run and the lamp will go off and on the same as if the timer was operating the range relay.

**Combustion is started with the air-acetylene flame. Then a stream of oxygen, directed by the decarbonizing blowpipe, hastens the burning of the insulation along the armature slot. The air-acetylene torch, at left below, and decarbonizing blowpipe are shown here with one of the stators on which they are used.**



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APPLIANCE Service

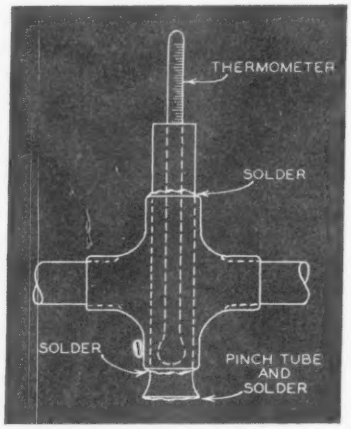
# Checking the Capacity Of Condensing Units

By Allen Parker

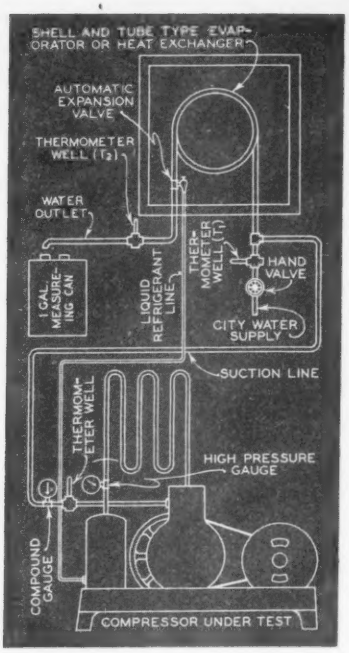
The refrigeration service man faces a difficult problem when he cannot make a condensing unit handle the amount of work that he thinks it should, or when he endeavors to determine if it is handling its rated capacity. A difference of opinion sometimes arises when new equipment is sold and it does not appear to handle the load that the sales engineer figured. Cases like these are often handled by the hit and miss method of changing the condensing unit for a larger one until the load is taken care of properly. In the meantime, it is never known whether the original condensing unit was delivering its rated capacity or not. This is especially unsatisfactory when installing a sealed unit as there is very little that can be done in the line of repair or checking the efficiency of individual parts, although if it was definitely known that the unit was not delivering its rated capacity, it could be returned to the factory for replacement.

A method suitable for making tests that will accurately determine the amount of work that a condensing unit will do can be set up in any service man's shop. Only a small investment is required, the essential element being a low side for a refrigeration system which load can be varied and its conditions accurately determined. Water at a known temperature is probably the most suitable medium with which to control the load of the low side. To build a low side coil for such a load tester, choose a shell and tube type condenser from some small commercial job which uses a copper coil within a copper coil such as is used to cool compressed gas with water. Or if this is not available, a small heat exchanger made of soft copper tubing having a refrigerant tube inside of another copper tube will be very suitable. The latter can be economically purchased from most refrigeration jobbers.

The next procedure is to build a cabinet large enough to house the coil with room for it to be well insulated on all sides with any good insulation, such as granulated cork, rock wool, etc. Connect an automatic expansion valve to the inner tube at one end of the coil. The other end of the coil will be the refrigerant outlet, using the inner tube, for the connection to the return line to the compressor. City water pressure will be connected to the outer tube of the coil with the water flowing in the opposite direction to the refrigerant, that is, the inlet for the water is at the same end as the connection to the refrigerant suction line.




**Construction details for thermometer wells used in testing refrigerator units to determine actual capacity. A brass cross fitting is connected into the line at the point where temperature is to be measured. A piece of copper tubing is inserted through vertical section of cross and soldered into fitting. The tube is pinched closed at the bottom and soldered. The fluid in the line will then flow through the cross and around the copper tubing inserted through the vertical section. A thermometer inserted in the vertical tube will indicate the temperature of the fluid in the line. For accurate results, the well should be insulated.**

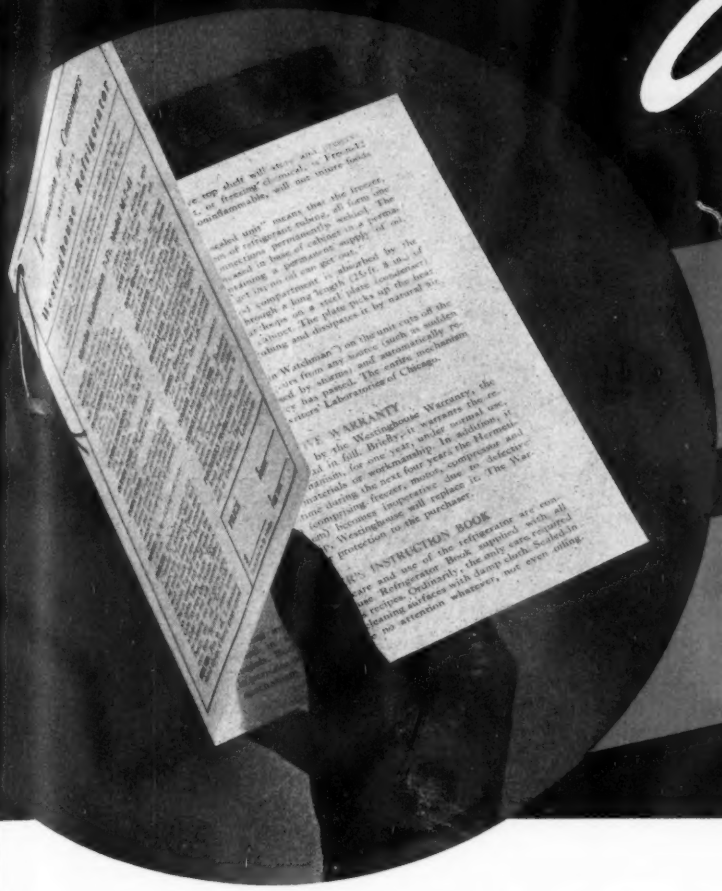



**The actual refrigerating capacity of a compressor unit can be determined with the arrangement of equipment shown here. Principal item of equipment is the loading device shown at top made from a shell and tube type evaporator or heat exchanger. Water is run through outer tube and refrigerant through the other, in opposite directions. Note the various gauges required and the thermometer wells. The accompanying text explains how to go about making the test and computing capacity.**

The flow of the water at the inlet must be adjustable; a hand valve placed at this point will serve this purpose. Also, the temperature of the water at this point must be known; therefore, a thermometer well is placed on the inlet line. A thermometer well can be easily made up by using a cross fitting in the water line, the water connections being made straight across with another piece of tubing about five inches long run completely through the vertical connection of

(*Continued on page 62*)

# An Idea THAT'S CLICKING!



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# NEWS of the INDUSTRY

## *Power Companies Announce Further Expansion of Plant Facilities*

So bright are industrial and defense-activity prospects for Macon and southeast Georgia that the Georgia Power Company has decided to double, even before it is completed, the 60,000-horsepower steam-electric generating plant under construction at Macon.

Completion of the unit as originally planned will be accomplished within three months. The additional unit, upon which work is to be started immediately, is scheduled to go into service late in 1942.

Named "Plant Arkwright," for P. S. Arkwright, company president, the plant will be larger than any generating plant in Georgia with the exception of Plant Atkinson, near Atlanta, which is now being increased in size from 100,000 horsepower to 200,000 horsepower by the addition of another generating unit. It will be completed next October.

* * *

National defense needs, superimposed on the ever-increasing normal requirements of the Louisville, Ky., industrial area, have necessitated construction of a new $5,600,000 steam electric generating station by the Louisville Gas & Electric Co., it was announced recently by T. B. Wilson, president of the utility.

The project represents approximately two-thirds of $8,300,000 the company has earmarked for expansion of its properties in connection with the national defense program.

The new station will start operation about June, 1942, with the two new 25,000-kilowatt turbo-generators. Ultimate capacity for power production, however, will be six times greater or 300,000 kilowatts.

Supplementing work on the plant itself will be the building of two 66,000-volt transmission lines from the new station to the various substations. These lines and necessary equipment will cost $300,000.

Accelerated activities at Fort Knox, Ky., called for a new 33,000-volt transmission line which has just been completed at a cost of $125,000, utility executives said. This line supplements a 33,000-volt line built in 1918 between Louisville and Fort Knox, thirty miles south.

Company engineers report a 25,000-kilowatt addition to the present Canal station costing about $2,500,000, will be in service by November of this year.

* * *

Directors of the Virginia Electric and Power Company have authorized new construction expenditures throughout the system amounting to approximately $9,024,765.

Two major construction projects started prior to January 1 and to be completed during 1941 or 1942 involved expenditures during the current year of $4,025,000 for the new Reeves Avenue power station in Norfolk, and $623,000 for the completion of a 110,000 volt transmission line from Richmond to Lee Hall, where it will connect with the electric system, of the Virginia Public Service Company to provide additional power to the Newport News-Hampton-Langley Field area.

* * *

According to Thomas W. Martin, president, Alabama Power Company will spend during 1941 approximately 6½ million dollars for construction. About one-third of this sum will be for the completion of the steam plant now under construction at Chickasaw, near Mobile, and expected to be in operation in May or June.

Nearly half a million dollars will be spent for the construction of new rural lines and over 2 million dollars will be used for extensions and improvements to existing rural and distribution facilities. $300,000 will be devoted to transmission line additions and improvements. Among these are the completion of the new Gadsden-Piedmont line, the stringing of a second circuit on the Leeds-Fulton Springs line; increasing the carrying capacity of the Gorgas-Tuscaloosa line from 40,000 to 110,000 volts, and establishing an additional delivery point for electricity supplied the Birmingham area.

The remainder of the construction program will be devoted to the improvement of service in various localities where there has been an increase in the use of electric service or where an increase seems likely within the year.

* * *

Plans by the Florida Power and Light Company to increase the capacity of its county causeway generating plant nearly four and a half times at a cost of between $2,000,000 and $2,500,000 were disclosed recently.

Tremendous population growths in the Miami area and increasing demands for power for national facilities necessary, reported McGregor Smith, president.

**The Oklahoma Gas and Electric Company has designed and is installing these "Reddy Kilowatt" policeman spectacular boards in and around Oklahoma City as the start of a drive to increase lamp sales in the territory. The boards are spotted only on heavy traffic corners. The "cut-out" nature of the figure in the center of the board, and the fact that it is extended out from the board generally, has made the displays most effective in gaining attention of passersby.**

The expansion will include installation of a 30,000 kilowatt generating unit, similar to the new turbo-generator installed last year at the Dania-Fort Lauderdale plant. The new unit will increase the present 8,500 kilowatt capacity of the causeway station nearly four and a half times.

Construction of two new buildings to house the added facilities will start immediately. The structure for the generator will cover 5,000 square feet, with a separate boiler building covering 2,000 square feet.

* * *

Construction of a 40,000-kilowatt turbine-generator is being started by General Electric for the Duke Power Company as part of a huge expansion program to keep pace with defense needs. The new unit will go into the company's Buck Station, near Spencer, N. C., and will entail expenditures totalling three million dollars, exclusive of necessary transmission lines and additional distribution facilities.

The present capacity of the Buck Station is 70,000 kilowatts. An 80,000-kw turbine-generator is now being shipped for installation by July, 1941. The two latest additions will bring this station's capacity up to 190,000 kilowatts in 1942—making it the largest plant in the Duke Power system.

The latest unit ordered will be of the tandem-compound, double-flow type with a hydrogen-cooled generator. Steam conditions will be 825 lb gage pressure, 900 degrees temperature condensing.

## South Carolina Authority To Buy Utility System

South Carolina Utilities Company, Conway, S. C., has applied to the Federal Power Commission for approval of the sale of all of its operating properties to the South Carolina Public Service Authority.

**The applicant, subsidiary of Walnut Electric & Gas Corporation, has operating facilities in the towns of Myrtle Beach, Loris and Conway, South Carolina, and in surrounding territory in Horry and Georgetown counties. The purchase price, according to copy of agreement filed with the Commission, is $835,000 plus certain amounts relating to additions, material and supplies and unbilled revenues as of the closing date, which the agreement states shall not be ltaer than March 1.**

The facilities to be sold are all of the company's operating properties and include a steam electric generating plant at Conway, a Diesel electric generating plant at Myrtle Beach, substations, transmission lines and rural lines.

The application states that acquisition of the properties by the South Carolina Public Service Authority has been endorsed by the town councils of Conway, Myrtle Beach and Loris, South Carolina.

## Exchange Conference Dates Announced

**The annual conference of the Southeastern Electric Exchange will be held this year at the Bon Air Hotel, Augusta, Ga., on May 1, 2, and 3, according to announcement by John W. Talley, executive secretary, Atlanta.**

**The Bon Air, having some 350 rooms, is located on its own beautiful garden estate, two miles from the center of Augusta, and has the reputation of being one of the most popular resort hotels in the South.**

## Institute Sets Dates For Sales Conference

Hundreds of utility new business men, appliance manufacturers, and other industry groups are arranging to attend the Eighth Annual Sales Conference of the Edison Electric Institute. The Conference will be held at the Edgewater Beach Hotel, Chicago, from March 31st to April 3rd.

The Power Sales, Rural Sales, Lighting Sales and Home Service Sections of the Institute will hold parallel conferences during the first two days. The General Sessions will take place both mornings and afternoons of April 2nd and 3rd.

The affect of the national defense program upon appliance sales and utility load building efforts will be covered from varying viewpoints as a feature of one of the general sessions.

The sessions of all groups other than that of the Power Sales will be open to all members of the electrical industry.

## Georgia A-W Bureau Will Certify Wiring

Approved installations of home electrical wiring will be officially certified by the Georgia Adequate Wiring Bureau throughout the territory of the Georgia Power Company, acording to an announcement by O. M. Jackson, sales promotion manager.

The Bureau is being sponsored by the Atlanta Electrical Association, composed of dealers, contractors, distributors, manufacturers and the power company. The territory served by the utility embraces 45,000 square miles of the state, with 187,000 residential customers. The new organization has set a mark of 500 new homes certified during 1941.

Mr. Jackson believes that certification of residential wiring installations will be the final step in an effective all-electric service program for Georgia. "Efforts will be intensified in 1941," he declared, "to bring about more and more adequate wiring installations with the resultant benefits to the user as well as to all allied interests. The next year will, in our opinion, see a growing appreciation of the value of adequate wiring."

The Georgia Power Company will offer a complete layout service free to builders, architects, contractors, and home-owners. A speakers' bureau will serve to provide interested civic groups with information about the activity.

Robert Wardle, Jr., special sales representative of the utility, will have direct charge of the certification activity. One assistant will work full time on wiring and the adequate wiring idea will also be promoted by four New Homes Representatives.

## Electrical Pioneer Dies in Florida

**Francis Jehl, said to be the last of the electrical pioneers associated with Thomas A. Edison during the period of his great inventions, died in St. Petersburg, Fla., in February. Jehl, 80 at the time of his death, served as personal assistant to Edison while the electric light was being invented, and after that spent several decades in Europe building power plants and popularizing the new lighting industry. Of late years, he had been connected with Henry Ford as curator of the Menlo Park laboratories.**

# *Washington Retailers Make Heavy Gains Against Discount Selling*

The annual report of the Electric Institute of Washington reveals a decided trend away from discount selling during 1940.

The tendency was particularly evident in range sales. Although total sales for 1940 and 1939 were approximately the same—2,349 and 2,347 in the respective years—retail sales increased 48 per cent. Sales to builders which cut into total volume heavily in past years fell off 35 per cent.

Retailers also made gains against the discount practice in electric refrigerators. Total sales were 19,382 in 1940 as compared with 17,719 in 1939. Retail sales were up 32.6 per cent while builder sales dropped off 20 per cent.

Impetus for this effective drive on the discount sales situation was given by the organization of dealers a year ago to cooperate in discontinuing the practice. At the same time wholesalers offered their cooperation.

Another factor in increasing dealer sales was a general decline in the practice of speculative builders to install ranges and refrigerators in newly-built homes as a sales inducement. Experience revealed that sales of new homes were not greatly affected by this plan.

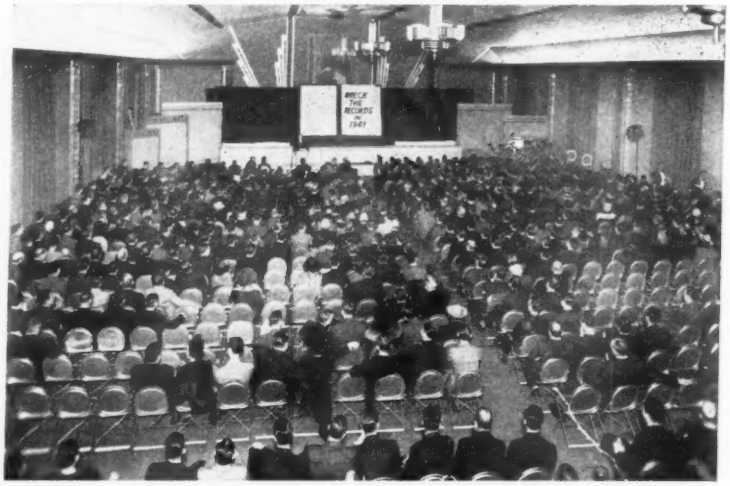
Saturation figures gained considerably in the Washington area during 1940, notably in refrigerators which increased to 85.5 per cent.

Comparative national and Washington saturation percentages are:

| | National | Washington |
|---|---|---|
| Ranges | 11.2 | 11.6 |
| Refrigerators | 63.0 | 85.5 |
| Oil burners | 6.3 | 21.4 |
| Washers | 61.6 | 58.6 |

## Campaign Opener Attended By 1000 in New Orleans

Sales of appliances in New Orleans showed a gain of 77 per cent during a five-year period, 1935 to 1940, approximately 1,000 appliance dealers and salesmen of New Orleans were told recently at a meeting at the Jung Hotel by S. L. Drumm, general sales manager for the New Orleans Public Service, Inc. Dramatizations in the form of skits were shown describing the comforts found in the present day home due to the use of appliances as compared to past years.



**A part of the crowd of approximately 1,000 appliance dealers of New Orleans who gathered at the Jung Hotel at a meeting sponsored by the New Orleans Public Service, Inc., to mark the opening of the 1941 sales campaign is shown above.**

**Leaders of the meeting sponsored by the New Orleans Public Service, Inc., at the Jung Hotel and attended by appliance dealers of New Orleans are shown, left to right, seated, S. L. Drumm, general sales manager of the New Orleans Public Service, Inc., the principal speaker; and A. G. Riddick, president of the Electrical Association of New Orleans. Standing, left to right, Cecil Burglass, president of the Radio Dealers' Association; E. N. Avegno, dealer sales manager of the New Orleans Public Service, Inc., and chairman of the meeting; and Peter Kenney, president of the Licensed Master Plumbers' Association of New Orleans.**

The meeting sponsored by the utility marked the opening of the 1941 sales campaign. Mr. Drumm predicted that business during 1940 would show an even greater increase.

Figures quoted by Mr. Drumm showed that in 1940 the sale volume of appliances in New Orleans had hit a new high of $5,500,000 as compared to $3,200,000 for 1935. He said this year's business should reach $5,800,000.

One of the skits showed the hardships that the cave man's wife underwent because she did not

# "What Do People Look For When Buying An Electric Refrigerator?"

**THE "SIX BEST SELLING FEATURES" are given this order of importance by a nation-wide survey among refrigerator dealers: 1. Brand Name. 2. Equipment, Interior Arrangements. 3. Price. 4. Style and Beauty. 5. Economy and Performance. 6. Construction.**

## GENERAL ELECTRIC *"Tops In Public Preference"* IS TOPS ON EVERY POINT!

**1.** *Brand Name.* Independent surveys conducted by five national magazines show that 50% *more people prefer the G-E than any other refrigerator.*

**2.** *Equipment, Interior Arrangements. New* Perfected Conditioned Air! *New* 10-Star Storage Features with the amazing new Butter Conditioner!

**3.** *Price.* G-E prices start at $119.95, with a model built to *everybody's* income. Dollar for dollar, it's the best buy in refrigeration.

**4.** *Style and Beauty.* In no other refrigerator cabinet will you find such a rare combination of beauty and quality!

**5.** *Economy and Performance.* No other sealed cold-making mechanism has the proved performance record of the famed G-E Thrift Unit for enduring economy.

**6.** *Construction.* In the notable list of G-E "firsts" is the all-steel cabinet, stainless steel evaporator, Thermocraft insulation, Textolite door strips, Glyptal enamel, and, of course, the *sealed* mechanism.

*It's G-E for Me!*

GENERAL ELECTRIC

have any of the present day appliances to make her day easier. It showed her preparing to cook the day's catch of fish over an open coal fire.

With the amazing increase in business a corresponding reduction in the price of electricity was made, the speaker stated. The present price being approximately one-half that of 1933.

During the five-year period ending 1940, the dealers were told, 26,798 families installed electric service, which represents an increase in service usage of electricity of 51 per cent.

The slogan of "Wreck the Records in 1941" was adopted at the meeting. Several of the skits dramatized how the records had been wrecked during the past year and how even greater heights could be attained during 1941.

The business prospects, together with the opportunities in the New Orleans market, present real rewards for those who will go after them, Mr. Drumm continued. More people to purchase, more money with which to buy, new and better appliances to sell, all coupled with lower operating costs, offer a new and unrivaled market during 1941.

E. N. Avegno, dealer sales manager of the Public Service was chairman at the meeting.

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## EHFA Offers New Terms On Higher Priced Washers

Electric Home and Farm Authority recently announced a change in terms on higher-priced washing machines. A large number of dealers have reported that longer terms on the higher-priced machines would be instrumental in placing more of such equipment in their customers' homes.

EHFA will now accept for financing electric washing machines having a retail cash delivered price of $125.00 or more for a maximum period of 36 months with a minimum down payment of 5% of the retail price. This change in terms also permits these machines to be financed for a period of 48 months when sold on the same contract with other appliances.

The terms on used washing machines have not been changed. *All used* washing machines, including the models having a retail value of $125.00 or more when new, require a 10% down payment and may be financed for a maximum period of 12 months when sold individually.

**Capitalizing on the influx of thousands of new residents moving to Jacksonville to participate in the activities of the Naval Air Station, Camp Blanding and the Air Port Training Camp, Anderson Appliance Company has moved into spacious new quarters on West Duval Street which will enable the company to increase its stock, enlarge its line of merchandise and render better service. This model kitchen occupies one corner of the new display floor.**

## Thomas Made President of Texas Electric Service

In a change announced by Texas Electric Service Company, Fort Worth, Texas, A. J. Duncan, formerly president, has been made chairman of the Board of Directors, and J. B. Thomas, formerly vice president and general manager, was made president and general manager.

Mr. Duncan has been with the power company in Fort Worth for the past thirty-five years. Mr. Thomas first became associated with him in 1929, with the formation of the Texas Electric Service Company, which serves Fort Worth, Wichita Falls, and other cities and towns in West Texas. Mr. Thomas is a native Texan and a graduate of Texas A. & M. College. He joined the Texas Power & Light Company's engineering department in 1912 and has been engaged continuously in the electrical lighting and power business since that time, with the exception of eighteen months' service in the first World War.

**J. B. Thomas**

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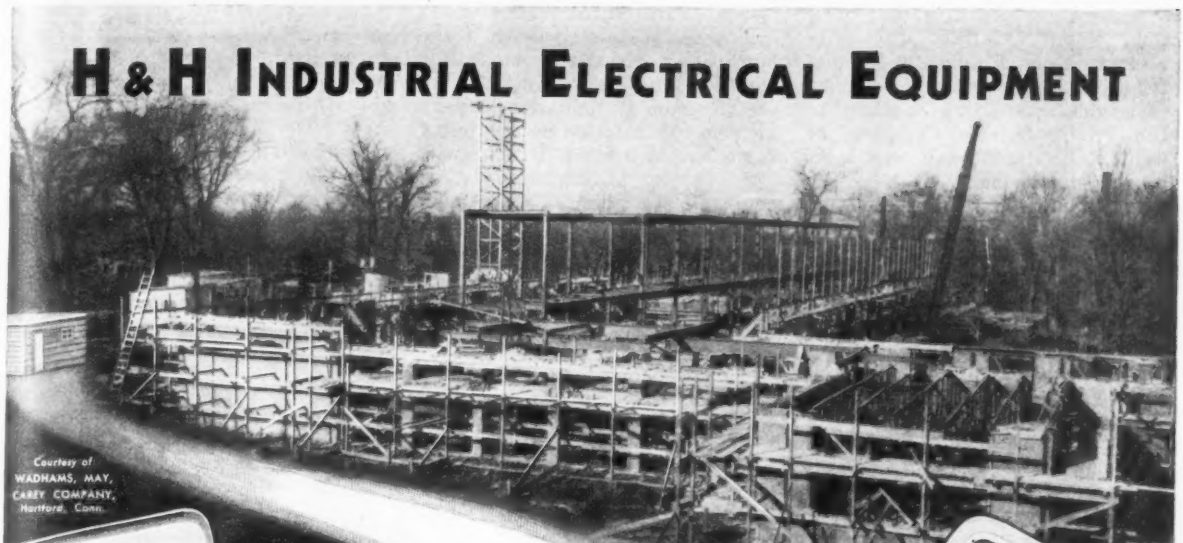
## Wilkes Joins Southwestern Gas & Electric Company

Appointment of Frank M. Wilkes, of Pine Bluff, Arkansas as assistant to the President and General Manager of Southwestern Gas and Electric Company, was announced recently by A. Lieberman, president of the company. Mr. Wilkes was formerly associated with the Arkansas Power and Light Company as operating vice president. His new headquarters will be in the general offices of the company in Shreveport.

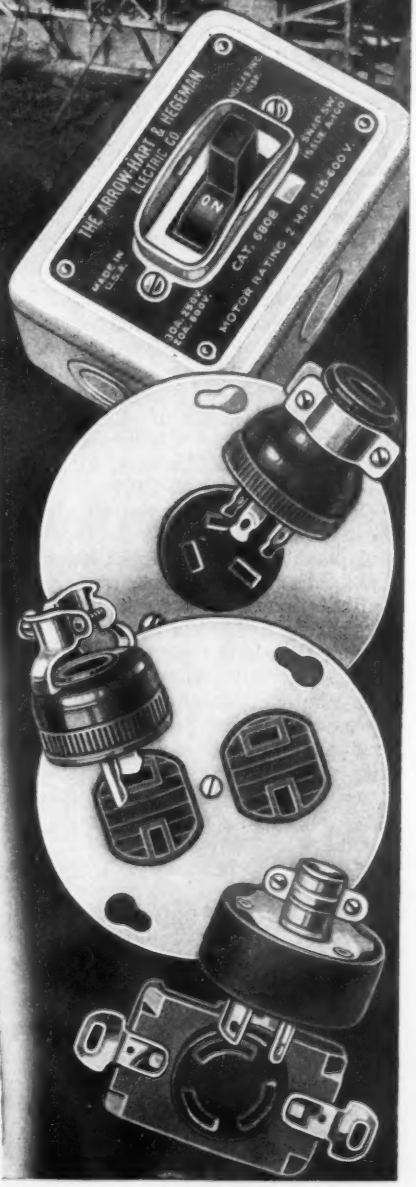
Mr. Wilkes' new duties will consist of giving general assistance to the president in the management of the company; he will give particular attention to co-operation with the government in plans involving electric power supply for national defense industrial requirements.

A native of Utah, Mr. Wilkes moved to Kentucky at an early age, and was reared and educated there. Upon being graduated from Kentucky State University with a degree in electrical engineering, he entered the employ of the General Electric Company, in Chicago. A short time later he left to become district inspector for the Public Service Company of Northern Illinois.

# H & H INDUSTRIAL ELECTRICAL EQUIPMENT



Courtesy of WADHAMS, MAY, CAREY COMPANY, Hartford, Conn.




## This way to Orders!

*NEW BUILDING* to meet industrial shortages . . . plant expansion for rearmament programs . . . this is the way to profitable wiring contracts. And the road to these orders is *lined* by H & H Industrial Devices. Here are typical wiring items for heavy-duty service, power and light:

Left side, first above, Weatherproof Switch, Weatherproof Receptacle. Second, Type C Ceiling Pull Switch. Third, 3-wire Rubber Cord Connector. Fourth, Type C Tumbler Switch.

Right side, first above, Small Motor Starting Switch. Second, 3-wire Receptacle with Rubber Plug. Third, 2-wire 20 Ampere Duplex Receptacle with cord grip Cap. Fourth, 3-wire Flush Receptacle with Cap.

★ ★ ★

Most all new buildings (and modernizations) will be *adequately* wired for maximum production and convenient power connections. Your H & H Line is *more* than adequate; it's the line that leads to the ORDERS.

HART & HEGEMAN DIVISION
THE ARROW-HART & HEGEMAN ELECTRIC CO. HARTFORD, CONN.

After three years in that position, which involved practically every field job required in the distribution of electricity, he resigned to become consulting engineer to the Public Service Company of Central Kentucky, and was later made general manager. Later he was transferred to the Missouri Public Utility Company, as manager of the Poplar Bluff division.

The first World war interrupted Wilkes' career at that point. Commissioned as captain, he was placed in command of the 222nd Field Signal Battalion at Camp Meade, Maryland, and his outfit was under orders to sail when the Armistice was signed.

Wilkes joined the Arkansas Power & Light Company late in 1919 as commercial manager. In 1920, he was promoted to operating superintendent of the company. In 1923, he was made general superintendent, and a few years later promoted to general manager. In 1940 he was elected operating vice-president.

### H. P. Hoheisel Named Advertising Manager

H. P. Hoheisel was named advertising and publicity manager for Oklahoma Gas & Electric Co., on February 1st, to succeed the late Leonard F. Nelson. Mr. Hoheisel has been a member of OG&E for twenty-one years. His connection with the industry, is even longer, dating back as far as 1916.

For the past twelve years he has been a member of the Sales Development Department, where his original and outstanding work has contributed to the success of many campaigns and other projects. He has at the same time been closely identified with the Advertising and Publicity Department; thus he brings to his new position a broad and comprehensive knowledge of the sales and advertising fields, together with an intimate understanding of the various phases of company operation.

### Carson Hickox Appointed Sales Promotion Manager

Carson E. Hickox, for the last four and a half years a member of the sales development department, Oklahoma Gas & Electric Company, Oklahoma City, has been appointed merchandise and sales promotion manager for the Arkansas Division, of Oklahoma Gas & Electric Company with headquarters at Fort Smith. Mr. Hickox has been associated with Oklahoma Gas & Electric for more than eleven years. He was in charge of the division's appliance department in 1930. Later, he was transferred to the eastern division with headquarters at Muskogee, before coming to Oklahoma City. In his new capacity, he succeeds W. R. Hopper, retired.

### Memphis Advertising Executive Opens Agency of His Own

Paul Renshaw, for 17 years advertising manager for the Memphis Power & Light Co., and its successor, has resigned to go into advertising agency work on his own account. It was in 1924 that Mr. Renshaw first set up an advertising department for the Memphis utility company and he continued in the capacity of director of advertising when the company was purchased in 1939 by the city of Memphis and converted to municipal operation.

Prior to his connection with the utility, Mr. Renshaw conducted an advertising service under his own name, and before that time had been connected with various newspapers and advertising organizations, including an agency in New York City. He began his career as a newspaper reporter, and throughout his career in publicity and advertising, he has been a frequent contributor to trade journals. He was also active in the organization of the National Electric Light Association, serving on public relations committee for both the national and the southeastern regional organizations.

### Jacksonville Dealer Attends G-E Meeting

J. Henry Sorrels, of the Heat and Cold Equipment Company, was appointed a delegate to the first annual convention of the Retail Development League of the General Electric Company in January in New York City.

Only 100 delegates were selected from the United States to attend the meeting of the league, which is the nationwide organization of the G-E appliance and merchandise department.

### Oklahoma Advertising Executive Claimed by Death

Death came suddenly, though not wholly unexpectedly, to one of the best known and hardest workers of Oklahoma Gas & Electric Company, Oklahoma City, when Leonard F. Nelson, advertising and publicity manager, passed away January 24th. He had been in ill health for two years but was so constituted that he would never give up and was at his desk right up to the day of his death.

Mr. Nelson was forty-one years old and had been with OG&E since 1926. He was originally from Minnesota, but in spirit was a real "Oakie." He left a wife, mother, two brothers, seven sisters and two stepsons. He had served in the United States Navy and was quite active in American Legion affairs, as well as in his work with the electrical industry.

### Georgia Inspectors Meet in Albany

Fifty members and guests of the Georgia Chapter, I. A. E. I., met on February 7th and 8th in Albany, Ga., for a two-day discussion of the 1940 National Electrical Code and problems that confront the electrical inspector.

Among the speakers who addressed the group, and their subjects, were:

Victor H. Tousley, Secretary-Treasurer, International Assn. of Electrical Inspectors, Chicago: "Interpretation of the 1940 National Electrical Code."

H. G. Knoderer, Commercial Engineer, Wiring Materials, General Electric Co., Bridgeport: "The New Conductor Insulations."

James F. Whitehead, Jr., Architectural Lighting Specialist, Georgia Power Co., Atlanta: "Code Problems that Arise in Connection with Commercial Lighting Installations."

Joseph Whitner, Assistant Chief Engineer, Southeastern Underwriters Assn., Atlanta: "Interpre-

# The ROYAL Road to Higher Profit ... via GraybaR

Model 177 Royal Super Grand is a high-power cleaner that combines "eye appeal" with utmost practicability. List price—$62.50. Other Royal horizontal cleaners are available from $19.95 to $49.95.

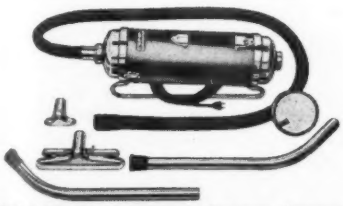
## Special Features

1. "Adjustorite" Efficiency Indicator.
2. New type headlight—throws a strong beam directly on surface being cleaned.
3. Powerful motor, with trigger switch at finger tips.
4. Powerful suction combined with motor driven brush.
5. Special Compo motor bearings, self aligning, automatically lubricated.
6. Patented wide opening bag, very easy to empty, specially reinforced at inlet.
7. Bag of heavy dust proof material, in two color design.
8. New tilting device and handle lock.
9. New type rubber pistol grip handle.
10. New revolving brush, triple-sealed to keep out dust. Lubricated automatically.
11. Compo bearings in wheels; assure long life and freedom from squeaks.
12. Positive nozzle adjustment for most efficient cleaning of rugs of any weave or thickness.
13. New nozzle guard to simplify cleaning small rugs.
14. New double wheels in rear to prevent tipping.
15. Super service, nonkinkable rubber covered cord.
16. "Floating power."
17. Streamline design.

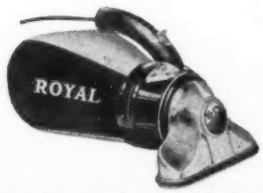
Heading the list of that top-ranking electrical need for the home—vacuum cleaners—comes the name of Royal. And the Super Grand Royal . . . like Graybar's all-inclusive supply service . . . is "tops" in its field. Known as Model 177, this vacuum cleaner incorporates the most modern style and operating features of the day. For example, one of many features that makes it a best-seller is the "Adjustorite," which gives instant visual indication of correct nozzle height. A quick glance at the list on the left will give you a clear picture of the wealth of value offered to your customers in the Super Grand line.

And don't forget, when you buy via Graybar you're taking advantage of the other half of a sure-fire winning combination. For, Graybar offers you such *extras* as "Johnny-on-the-spot" supply service and a local source for "everything electrical."

Taken together, we're sure you'll agree that you can't go wrong by asking your Graybar Man for the complete story on Royal Vacuum Cleaners. Or, if you prefer, write today for further information. You won't be sorry! Graybar Electric Co., Graybar Bldg., New York, N. Y.



Model 186 "Royalaire" cylinder-type cleaner is extremely easy to operate, almost noiseless. Can be used for moth-proofing, deodorizing, "above the floor cleaning," etc. List price ---------- $49.95




Model 157 Royal Hand Cleaner is a revolving brush type cleaner. Remarkably efficient. List price $16.95

**GRAYBAR IN OVER 80 PRINCIPAL CITIES**

GraybaR QUALITY — Distributed and guaranteed by GraybaR ELECTRIC COMPANY

tation of Articles 210 and 220 on Branch Circuits and Feeders."

Arnold King, Electrical Inspector, R.E.A., Marietta: "Code Problems that Confront the Rural Inspector."

An invitation from W. I. Foote, Sr., chief electrical inspector of Griffin, Ga., to hold the next annual meeting of the Chapter in Griffin was accepted.

New officers elected to serve during the administrative year of 1941 are: chairman, C. V. Reynolds, Savannah; 1st vice chairman, W. I. Foote, Sr., Griffin; 2nd vice chairman, Arnold T. King, Marietta; secretry-treasurer, Carl W. Evans, Atlanta; and the following executive committeemen: R. E. L. Shirley, Atlanta, R. U. Deming, Valdosta, and W. O. Aldridge, Moultrie. Mr. Shirley was named chairman of executive committee.

**Bibbens-Bent, Inc., distributors in the north Florida-south Georgia territory for Philco products recently presented a showing of the 1941 line of Philco refrigerators to dealers in the territory. Featured on the program were Sayre M. Ramsdell, director of promotion for Philco corporation, and Max Enelow, Philco's advertising counsel. Left to right, Mr. Enelow, Van Etten Bent, Ross Bibbens and Mr. Ramsdell.**

## New Officers for Kentucky Chapter, I.A.E.I.

A Lexington, Ky., utilities engineer, R. W. Wilson, was elected chairman of the Kentucky Chapter, International Association of Electrical Inspectors at the group's recent annual convention, at the Brown Hotel, Louisville.

Mr. Wilson succeeds Robert J. Heffernan, Louisville. Other officers chosen included, Harry Hischemiller, Bromley, Ky., vice chairman; and Victor F. Knadler, Louisville, named secretary-treasurer for his thirteenth year.

## Texas University Sponsors Lighting Conference

The first lighting conference staged at the University of Texas, in January, was most successful. Attendance included illuminating engineers, representatives from the State Health Department and State Department of Education, operating electrical companies, lighting equipment manufacturers' representatives, representatives from some of the major department stores over Texas, representatives from the Lower Colorado River Authority, Texas architects, electrical dealers and members of the City of Austin Electrical Department.

The Thursday meetings included a morning session on lighting fundamentals and an afternoon session on application. The Friday morning session was on fluorescent lighting, and the afternoon session was given over to architectural lighting and floodlighting. On Saturday morning there was a session on production and national defense.

Those presiding at these five sessions were as follows and in this order: C. R. Granberry, professor of electrical engineering, University of Texas; J. Fred Horn, director, School Plant Division; Floyd A. Covington, lighting specialist, San Antonio Public Service Company; Walter T. Rolfe, chairman, Department of Architecture, The University of Texas; and Robert W. Warner, chairman, Department of Electrical Engineering, University of Texas.

Each session included four separate subjects, discussed by different engineers or specialists. Speakers in addition to the five mentioned included: Rudolph J. Biesele (Westinghouse, Dallas); George Dahl (architect, Dallas); V. J. Graham, (General Electric, Dallas); Capt. N. B. Gussett (San Antonio); Dr. D. B. Harmon (State Department of Health, Austin); James M. Ketch (Nela Park, Cleveland); Max Starcke (Lower Colorado River Authority, Dallas); and Gordon Conkle (Nela Park, Cleveland).

## Honor Roll of Southern Section

The following members of the Southern Section, International Association of Electrical Inspectors, have enrolled one or more new members for the association since the current membership campaign was initiated at the close of the annual meeting, September 14. Numbers at right indicate number of new members enrolled by each individual since the membership campaign began last September.

| Name: | No. Enrolled: |
|---|---|
| Bagwell, H. O.—Carrollton, Ga. | 1 |
| Bommer, A. J.—Dallas, Texas | 5 |
| Camus, Frank—Shreveport, La. | 7 |
| Campbell, R. D.—Asheville, N. C. | 1 |
| Dougherty, C. H.—Franklin, Va. | 1 |
| Eberling, J. H.,—Houston, Tex. | 1 |
| Edwards, Virge—Lyon, Miss. | 16 |
| Fisher, J. G.—Jackson, Miss. | 3 |
| Fletcher, G. R.—Alexandria, Va. | 2 |
| Goodson, Fred—Houston, Texas | 3 |
| Hancock, A. E.—Austin, Texas | 2 |
| Hendricks, R. B.—San Antonio | 5 |
| Jones, C. T.—Atlanta, Ga. | 1 |
| Keeley, K. K.—Shreveport, La. | 2 |
| Kersey, T. M.—Dallas, Texas | 1 |
| Kenderdine, E. L.—Ft. Worth, Tex. | 1 |
| Kersey, T. M.—Dallas, Texas | 1 |
| King, A. T.—Marietta, Ga. | 1 |
| Knox, E. C.—Miami, Fla. | 2 |
| Lyncker, F. O.—New Orleans, La. | 1 |
| McKinney, E. W.—New Orleans | 2 |
| Mathieu, L. D.—Corpus Christi | 1 |
| Miller, G. M.—Richmond, Va. | 1 |
| Muller, Paul—New Orleans, La. | 1 |
| Peters, K. O.—St. Petersburg, Fla. | 2 |
| Sagendorf, F. P.—Fairfax, Va. | 1 |
| Segall, B. Z.—New Orleans, La. | 4 |
| Sprouse, J. B.—Clarksdale, Miss. | 7 |
| Stewart, W. B.—San Antonio, Tex. | 1 |
| Turnage, L. A.—Hartsville, S. C. | 1 |
| Verrett, J. A.—Port Arthur, Tex. | 2 |
| Weber, Chas.—Beaumont, Tex. | 1 |
| Welman, George—New Orleans | 2 |
| Whitner, Jos.—Atlanta, Ga. | 3 |
| Yancey, W. H.—Charlotte, N. C. | 1 |
| Yelverton, T.—Sylvarena, Miss. | 1 |
| Zimmer, Chas.—Houston, Tex. | 1 |
| Applications Not Endorsed | 2 |
| Total | 89 |

### Wholesalers Will Meet In Hot Springs, Va.

The Thirty-third Annual Convention of the National Electrical Wholesalers Association will be held at The Homestead, Hot Springs, Virginia, May 18-22, 1941, according to announcement by E. Donald Tolles, managing director, New York.

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### Gibson Corp. Names New Southern Distributors

F. E. Basler, general sales manager, Gibson Electric Refrigerator Corp., Greenville, Michigan, has recently announced the appointment of the following southern distributors to handle Gibson Freez'r Shelf refrigerators and Gibson electric ranges: Glasgow-Allison Co., Charlotte, N. C., Graybar Electric Co., Inc., Atlanta, Ga., McWilliams Hardware & Furniture Co., Inc., Longview, Texas, and The Otis Hidden Co., Louisville, Ky.

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### Personnel Changes Made by G-E Supply Corporation

As of February 1, 1941, the following organization changes become effective in the Atlanta district of General Electric Supply Corp., according to announcement by R. A. Clark, southeastern district manager:

J. N. Crevasse, formerly manager (supplies) at Jacksonville. transferred to Atlanta and appointed district supply sales manager.

H. B. Zimmerman becomes manager (appliances) at Jacksonville.

F. C. Elwes, formerly manager (supplies) Miami, transferred to Jacksonville and appointed branch supply sales manager.

J. E. Crotty, formerly manager (supplies) at Savannah, transferred to Miami and appointed manager (supplies).

T. H. Cherry, formerly branch service manager at Savannah, becomes manager (supplies) Savannah.

O. M. Ruff, Jr. transferred from Atlanta to Savannah and appointed branch service manager.

L. W. Furr, formerly branch service manager at Tampa, transferred to supply sales in the Tampa area.

Guy Johnson transferred from Atlanta to Tampa and appointed branch service manager.


RUBBER COVERED POWER CABLES · BUILDING WIRE

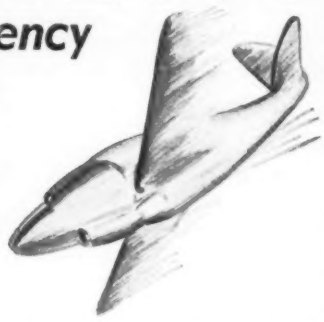
CRESCENT

*meets the emergency which demands*

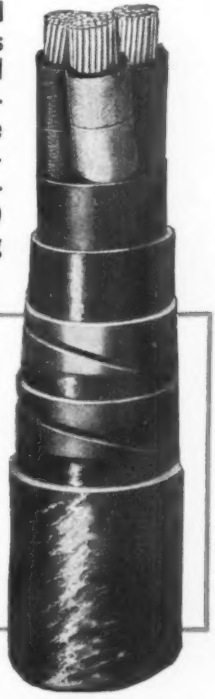
MORE SPEED—
MORE POWER

*for*

DEFENSE



CRESCENT has been working night and day, meeting defense needs as well as keeping up with the demands of normal business. Every man is at his post—putting his utmost efforts into producing the finest wires and cables we know of—helped by over 50 years of knowing how.



RUBBER POWER CABLES
SIGNAL CABLES
CONTROL CABLES
VARNISHED CAMBRIC CABLES
PORTABLE CABLES
PARKWAY CABLES
BUILDING WIRES and CABLES

CRESCENT INSULATED WIRE & CABLE CO.
Ask Your Electrical Wholesaler for

CRESCENT
WIRE and CABLE

*Factory:* TRENTON, N. J.—*Stocks in Principal Cities*

SOUTHERN REPRESENTATIVES

ATLANTA, GA. Edgar E. Dawes A-4 Rhodes Bldg. Annex
NEW ORLEANS, LA. Paul Hogan, Jr. 823 Perdido St.
DALLAS, TEXAS Huie-Simmer Co. 103 Thomas Bldg.

CRESFLEX NON-METALLIC SHEATHED CABLE · SERVICE ENTRANCE CABLE · MAGNET WIRE · BARE WIRE

ARMORED CABLE · FLEXIBLE CORDS · LEAD-ENCASED AND PARKWAY CABLES · VARNISHED CAMBRIC

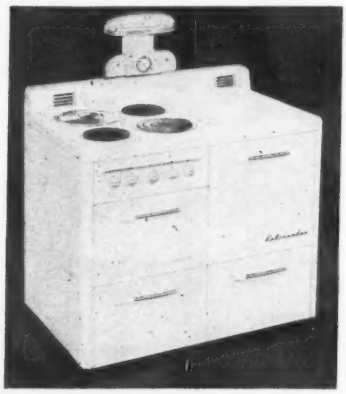
CRESCENT ENDURITE SUPER-AGING INSULATION

# MANUFACTURERS' News

## Kelvinator Range Line Features Three Models

Announcement of the new 1941 Kelvinator electric range selling program, a plan patterned in many of its phases after the revolutionary 1940 Kelvinator electric refrigerator manufacturing and selling program, is made by Frank R. Pierce, general sales manager of the Kelvinator Division of Nash-Kelvinator Corporation.

In announcing the new program, Pierce said that it featured prices $20 to $30 lower than last year, a simplified line concentrated in three models and a new type of selling tool called the "Salesmaster." The new line, Mr. Pierce reported, consists of the model ER-411 at $99.95; the model ER-413 at $139.95 and the model ER-417 at $169.95. Prices, he pointed out, are for delivery in the kitchen anywhere east of the Rocky Mountains.



**Popular-priced model in Kelvinator's 1941 line of electric ranges is the ER-413, which has a suggested delivered-in-the-kitchen price of $139.95.**

The 1941 Kelvinator electric range line is arranged in such a way that all three models boast a common group of basic convenience and construction features that can be used in selling the entire line. These include such things as a full 39-inch width; utility drawers on ball-bearing rollers; a recessed, sloping switch panel; an oversize oven with automatic pre-heat cut-off; a scotch kettle; ring or red type surface units; porcelain enamel exterior one-piece construction and one-piece top with wide back splash.

Big value story for the low-priced market is found in the model ER-411 which carries a suggested price of $99.95 and which has all the fundamental Kelvinator features. This leader model, like all 1941 Kelvinator electric ranges, has the new oversize, two-unit oven with a hydraulic thermostat, automatic pre-heat cut-off, "Broil" and "Bake" pilot lights and a black porcelain heat director. The upper unit in the oven is a 3000-watt unit while the lower unit is a 2400-watt unit.

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## Refrigerator Price Increases Announced

F. B. Williams, Manager, Hotpoint Refrigeration Division, has announced that, due to increased manufacturing costs, there has been a five-dollar increase in the list price of all Hotpoint refrigerators, effective at once. The flat five-dollar increase applies to each model in the Hotpoint refrigerator line.

* * *

A new price structure which includes $5 increases in the suggested retail prices of five of the eight 1941 Kelvinator electric refrigerator models and four of the seven 1941 Leonard models has been announced by the Kelvinator Division of Nash-Kelvinator Corporation.

An increase of $10 on one Kelvinator model, the M-8, and one Leonard model, the LH-8, was also announced.

## Toastmaster Plans Largest Spring Sales Campaign

With final sales figures for 1940 running through the tabulating machines, the Toastmaster domestic appliance division of McGraw Electric Co. is cheerfully contemplating a 19% sales increase over 1939. The fact that 1939 was the previous largest year in Toastmaster history, and that 1940 has stretched to "seven straight" a series of largest-ever years starting back in 1934, makes the performance especially noteworthy.

That prospects for 1941 are equally bright is indicated by the announcement that the spring advertising schedule for Toastmaster products will be heavier, by a substantial margin, than any similar campaign in the company's past experience. Seven national magazines will furnish the impetus, with "key" pages in full color and numerous smaller insertions in black and white. The schedule has been arranged to provide for the appearance of a Toastmaster advertisement in one or more magazines every week between January and June.

According to W. E. O'Brien, Toastmaster domestic appliance sales manager, there is every indication that business conditions throughout the country will enable the company and its distributors and dealers to cash in on this increased investment. With rising employment and higher wages, there should be a growing demand for electrical appliances of Toastmaster quality.

Current plans for Toastmaster spring promotions include new sales helps linked with forthcoming national advertising. Newspaper mats, envelope enclosures, and attractive booklets for counter distribution, are being furnished to retailers featuring the Toastmaster line.

**There is one model laundry in the American Furniture Mart's newly decorated "Kitchen Klinic." It is all-Hotpoint and shows a distinct contrast between the basement "torture chamber," which used to serve as a home laundry, and the comfort and convenience of today's modern utility room. Everything for completing the family wash is there, including a Hotpoint Spinner washer, the new 1941 Tumbler Clothes drier, and a Hotpoint ironer, as well as a Vogue-type Hotpoint electric water heater whose styling equals that of the other appliances.**

# IN 1941 FRIGIDAIRE DEALERS ARE CASHING IN ON AN EVEN GREATER

## *Leadership in Action*

### ✓ All-time high in Sales!

1941 sales to date are biggest in history—ahead of the 1940 record-breaking pace that reached over 625,000 units.

### ✓ Greatest production in history!

Even at this early date, the Frigidaire refrigerator factory, world's largest, is producing at a FASTER pace than the all-time record of 1 refrigerator every 17½ seconds manufactured during last year's PEAK SEASON.

### ✓ Greatest products in history!

Inside and out, the 1941 Frigidaires are the most brilliant ever built... a fact that has been proved by unprecedented nation-wide public acceptance. New Beauty! Usefulness! Economy and Value again make Frigidaire the hottest line in the industry!

### ✓ Greatest Sales Program ever!

Again in 1941 Frigidaire leads with the most intensive advertising and practical sales plans in the industry. Only an organization with Frigidaire's experience and record of Leadership in Action could provide a program so effective in meeting each dealer's needs and increasing his sales leadership in his community.

FRIGIDAIRE DIVISION • General Motors Sales Corporation, Dayton, Ohio
*Frigidaire Electric Appliances • Refrigerators, Ranges and Water Heaters*

**MORE THAN EVER IT PAYS TO**

## *Sell the Favorite— Sell Frigidaire*

***Over 6 million built and sold!***

## Westinghouse to Build Fluorescent Lamp Plant

To fill lighting needs of new industrial plants engaged in national defense work, Westinghouse will build immediately at Fairmount, W. Va., what is said to be the largest plant in the world devoted exclusively to the manufacture of fluorescent lamps, at a cost of $3,000,000, David S. Youngholm, vice-president, announced recently.

The new plant will be windowless and adapted for complete blackout in emergency. From 800 to 1000 workers will be employed, and operation is scheduled to begin in July.

With an immediate production capacity of 50,000 units per day, the plant will have an estimated peak output of 200,000 units per day. Most of the employes will be women, as they are more adept and skillful than men in many lamp manufacturing operations.

Site of the factory is a 90-acre tract on the Monongahela River, 3 miles from the center of Fairmont. Built according to modern practice in industrial architecture and design, the new plant will be a one-story building without windows or skylight, 830 feet long and 220 feet wide.

An important consideration in locating the new plant at Fairmont is the ready availability of natural gas. Gas jets on lamp-making machines mold the glass bulbs automatically and perform a sealing operation. Natural gas also will be used to heat the plant.

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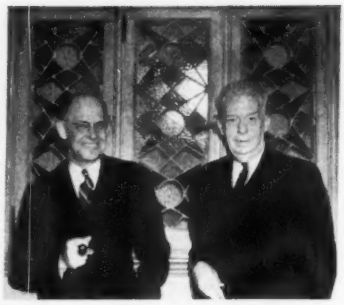
## Full Size Range Line Announced by Everhot

The Swartzbaugh Manufacturing Company, Toledo, Ohio, long identified with the manufacture of small domestic electric cooking appliances and whose "Everhot" trade mark is known in hundreds of thousands of homes, is entering the major appliance field with a line of three large size electric ranges.

All three models have the same basic chassis and quality, the difference in price being accounted for by the accessories provided. (A deluxe model is shown here.)

Chief Everhot range features, many of them exclusive, include: large capacity oven (17" x 17" x 19"); seven heat switches built into splasher back for extra convenience and safety; large capacity warming oven; splatter-proof, smokeless broiler; choice of four surface burners with separable surface cooker or three surface burners with built-in deep well cooker; new oven vent system that's easily cleaned—keeps oven more humid; and front door servicing with any necessary service work done entirely from front of range.

Everhot Range Catalog No. 300, describing the new line, is now available.



**The South was well represented at the Wiremold conference, held in Hartford, Conn., early in January. Among those in attendance were O. T. Jenkins, left, Wiremold district sales manager of Dallas, and H. C. Biglin Wiremold district sales manager of Atlanta.**

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## Proctor 1941 Sales Plans Announced

Forecasting the biggest sales year in the company's history, Roscoe E. Imhoff, general sales manager of the Proctor Electric Company, announced merchandising plans and a continuation of the company's extensive national advertising program to Proctor division managers and salesmen from all sections of the United States at a headquarters meeting in Philadelphia.

Mr. Imhoff predicted a substantial increase in Proctor sales in 1941, and stated that the increase in 1940 over 1939 was 114%.

Continuing as headline attractions for the new year will be the Proctor Never-Lift iron and "pop-up" toaster, which has a special device enabling it to be used for making Melba toast. too. This feature has been proved practical and has resulted in the sale of thousands of Proctor automatic toasters, according to Mr. Imhoff.

The Proctor consumer advertising program will continue to feature both the Never-Lift iron and the toaster and will appear in the Saturday Evening Post, Woman's Home Companion, Good Housekeeping and Life. New merchandise and merchandising plans will be announced to the trade in a consistent program of trade paper advertising. The trade paper schedule for 1941 is more than double that of 1940.

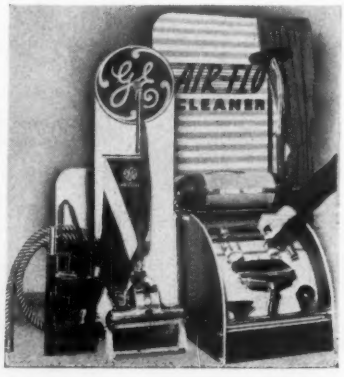
## Eleven Models Featured In G-E Cleaner Line

Consistent campaigning along the lines already established — sales through dealer outlets, models designed for specific types of retailing operations, swiftly-paced campaigns aided by national and local advertising, and combination deals competitively priced—has been prescribed for the promotion of vacuum cleaners during 1941 by the General Electric appliance and merchandise department, Bridgeport, Conn. So successful have been these methods to date, in the opinion of A. L. Atkinson, manager of the cleaner section, that they have resulted in marked changes in cleaner merchandising throughout the industry as well as in increased sales for G-E.

"Don't pull down the shade!" on dealer displays, on local advertising, and on rapid-fire promotions keyed to definite buying groups, is the theme message that has been passed on to distributors and dealers throughout the country.

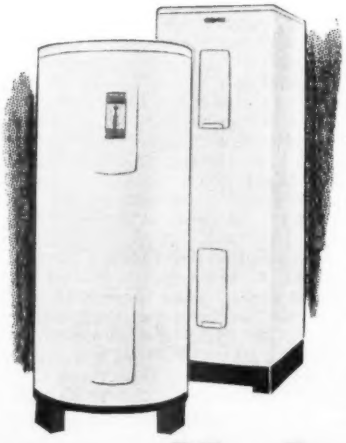
The G-E cleaner line for 1941 was built to fit the needs of three classes of retailers, and has been priced accordingly. The first group are the G-E specialty appliance dealers, so set-up that they can sell de luxe cleaning equipment of both floor and tank types through the more expensive specialty selling methods. In the second class are most other retailers, including hardware stores, small furniture stores, competitive dealers, and even retailers who may be foreign to the electric appliance industry. For these dealers, forceful promotions around combination offers—matching hand and floor cleaners, floor cleaners and carpet sweepers, or cleaners and attachment sets—have been designed, competitively-priced and merchandised in such a way that store traffic will be created. The third group comprises department and furniture stores or syndicate buyers, where price appeal is paramount.

The 1941 G-E cleaner line, upon which the promotional program is based, consists of five floor-type cleaners with motor-driven brush, two tank-type cleaners, and four hand cleaners, one of which is sold only in combination with a matching floor cleaner. There are also two sets of attachments available, priced at $9.95 and $12.95, respectively.



# WOULD YOU BELIEVE IT?

COMPLETE RELAXATION IN A TUB OF WARM WATER SOOTHES TIRED NERVES-REFRESHES, RESTS AND STIMULATES THE ENTIRE BODY!



OF THE 25,200,000 WIRED HOMES IN THE U.S. ABOUT 4% HAVE ELECTRIC WATER HEATERS! A GREAT MARKET LIES AHEAD!

NEW home building and modernizing is still skyrocketing. Eight out of nine homes have no automatic hot water service whatsoever. Every new home should have Automatic Electric hot water service—the market is waiting for you. Cash in on it with Hotpoint, the best-known and most complete line in the industry. Ask about Hotpoint sales promotion helps. Edison General Electric Appliance Company, Inc., 5614 W. Taylor Street, Chicago, Ill.

AUTOMATIC ELECTRIC **Hotpoint** WATER HEATERS

ELECTRIC RANGES · REFRIGERATORS · WASHERS AND IRONERS
CLOTHES DRYERS · AUTOMATIC DISHWASHERS · ELECTRASINK

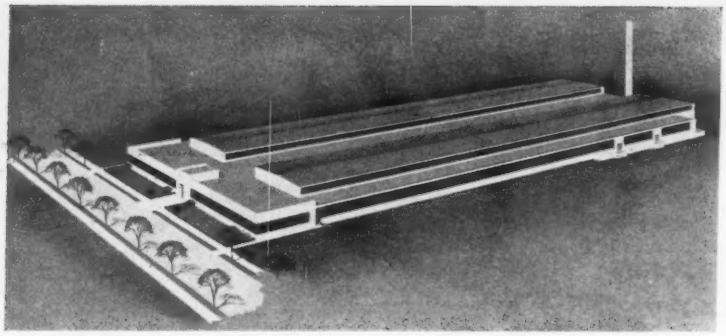
Edison General Electric Appliance Company, Inc.
5614 West Taylor Street, Chicago, Illinois

Please send me full information on the complete line of Hotpoint Automatic Electric Water Heaters.

*Name*_____

*Address*_____

*City*_____ *State*_____



## New Curtis Plant Ready For Occupancy in April

Curtis Lighting, Inc., is now constructing a modern plant in the Clearing Industrial District near Chicago. Early in April of this year, the company's national offices will move with the production division into their new headquarters.

The new structure, which is being built in the record time of 50 days, will be a one-story, line-production plant, designed to increase Curtis output from 30 to 50 percent.

Darwin Curtis, president of the company, stated that the main purpose of the expansion program is customer consideration. He added that the concern's present plant is operating at maximum capacity and the volume of business is continuing its upward trend. Mr. Curtis said the one-story layout will give the concern considerable and immediate increase in manufacturing capacity with an option on additional ground sufficient to double the size of the plant later, if necessary.

"The constantly growing demand upon production facilities," said Mr. Darwin Curtis, "is due, in greatest part, to the growing acceptance of the fluorescent lamp, and in lesser part to orders directly connected with the defense program.

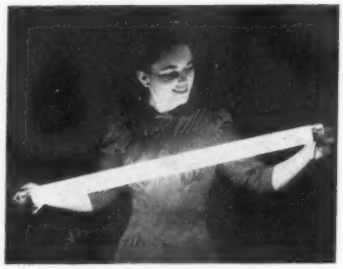
"The linear design of the fluorescent lamps," remarked Mr. Curtis, "has introduced many new problems into the manufacture of lighting equipment. Our new plant is laid out to accommodate the production of long lines of fluorescent equipment, as well as our "X-Ray" and "Eye-Comfort" incandescent equipment."

## New Fluorescent Lamp Rated at 65 Watts

Development of a new 36-inch Mazda F (fluorescent) lamp rated at 65 watts and available in 3500-degree white and daylight has been announced by General Electric's lamp department at Nela Park, Cleveland. It will be available April 1, 1941.

The new 3-foot lamp is designed to provide lighting designers with a more flexible tool for creating well-styled and efficient commercial luminaires. Like the 100-watt F lamp, the new 65-watt employs a tubular bulb 2-1/8 inches in diameter.

Introduction of the new fluorescent lamp brings to 8 the number of different wattages offered by General Electric in its wide range of Mazda F lamps. These wattages range from 6-watt sizes to 100-watt F lamps. Eight lengths range from 9 inches to 60 inches, four diameters of tubular bulbs from 5/8 inches to 2-1/8 inches. The 15, 20, 30, and 40-watt sizes come in a variety of colors. All lamps in the G. E. Mazda F lamp line are available in daylight and white. Many may be had in the new soft white hue.



Luminaires employing four or six of the new 65-watt G.E. Mazda F lamp will, according to Nela Park engineers, provide commercial fixtures of good proportion and appearance. When installed on recommended fixture spacing, such fixtures will also supply a quantity of light suitable for meeting modern illumination requirements. The new lamp makes possible an increased flexibility and effectiveness in luminaire design.

Essential data pertaining to the physical and electrical characteristics of the new lamp are as follows:, type—Mazda F; service—general lighting; lamp watts (approx.)—65; lamp amperes (approx.)—1.35; lamp volts (approx.)—50; bulb—T-17 (2-1/8 inches diam.); nominal length (1 lamp and 2 sockets)—36 inches; base—mogul bipin; color—3500° white and daylight; position of burning—any; rated initial lumens (at the end of 100 hrs. burning)—3500° white, 2100—daylight, 1800; rated average life—2000 hours.

## Extended Protection Plan for Frigidaires

All owners of 1936 Frigidaire electric refrigerators with sealed-in rotary type cold making units this year will be offered an extended protection plan on the unit, according to an announcement by Frigidaire Division, General Motors Sales Corporation. The offer applies, at this time, only to 1936 units as models sold and installed that year are the first to reach the expiration date of the company's five year protection plan which was offered originally in 1936, the announcement said.

Under operation of the extended protection plan, the payment of $10 by a user of a 1936 model will provide a four year extension of the warranty period. It is stipulated in the plan that each user who wishes to take advantage of the warranty extension must purchse the new protection contract before the expiration date of the original warranty.

## Norge Sales for '41 Up Forty-One Per Cent

Sales through January 31 of all products of Norge Division, Borg-Warner Corporation showed an increase of 41.4% over the corresponding period for 1940, it was announced by M. G. O'Harra, vice-president in charge of sales.

"Reports from the field now definitely indicate that features like the new exclusive Norge Night-Watch are moving merchandise rapidly from dealer's stocks. Replacement of these stocks will be reflected in sales figures during coming months and should carry the increase even higher than the 41% figure already reached," Mr. O'Harra said.

## Chrysler Airtemp Starts Drive for New Dealers

A comprehensive program of advertising and sales promotion for 1941 has been prepared by the Airtemp Division of the Chrysler Corporation. The plan was presented in detail to the 48 district managers of the Division at a meeting in Dayton last week.

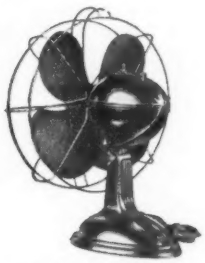
Highlight of the convention was a series of skits written and acted by Arthur Suit, district manager at Washington, D. C. and Jack Duer, district manager at Cincinnati, under the direction of Ward Barnett, merchandising manager.

In their talks to the field organization Earl Marr, general sales manager, and Mr. Barnett, made it clear that the division had a big job laid out for 1941: first, in completing national distribution, and second, in aiding Airtemp direct dealers to get their share of the increasing market for air conditioning equipment. A minimum of 10% of the local share of a national market estimated at $131,000,000 for this year, was set as the sales goal in every territory.

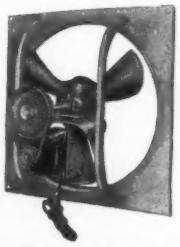
D. W. Russell, president of Airtemp, pointed out that in six years several millions of dollars had been spent by the Chrysler Corporation to bring Airtemp to its present position in the industry. He called attention to the trend toward packaged air conditioning units and toward year-'round air conditioning in the home. The immediate goal, he said, was 500 new dealers.

# AIR CIRCULATING and cooling EQUIPMENT

*VICTOR New Revolaire by Victor Electric Products, Inc., Cincinnati, Ohio.*



*R. & M. BANNER Fans, by Robbins & Myers, Inc., Springfield, Ohio.*



*BUFFALO Brees-Air Cooling Fans, by Buffalo Forge Company, Buffalo, N. Y.*

## Advertisers In This Section:

American Coolair Corp.

Autovent Fan & Blower Co.

Buffalo Forge Co.

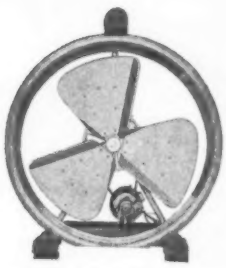
Hunter Fan & Ventilating Co., Inc.

Robbins & Myers, Inc.

Schwitzer-Cummins Co.

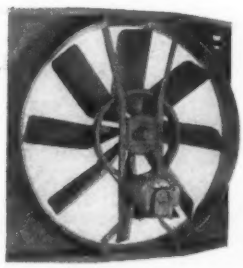
Signal Electric Mfg. Co.

Victor Electric Products, Inc.

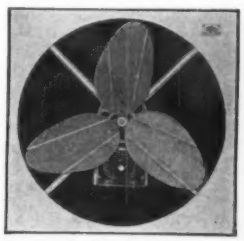


*THE FRESH-AIR MAKER by Schwitzer-Cummins Co., Indianapolis, Ind.*

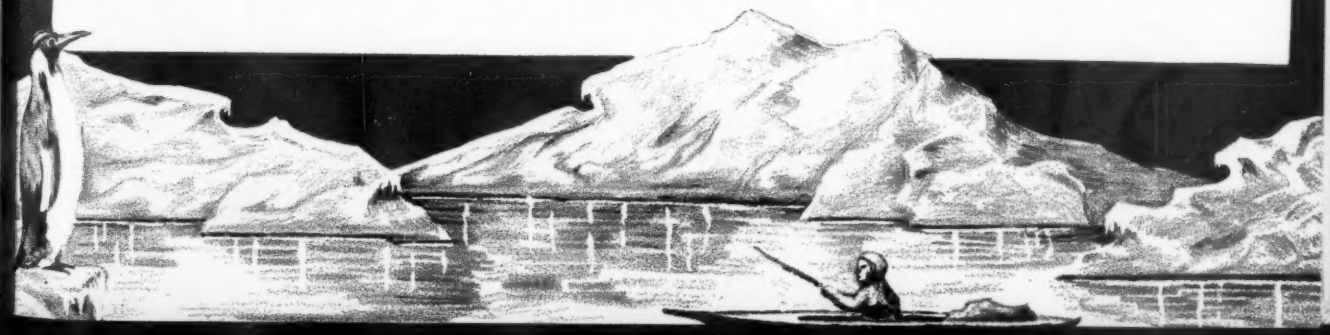
*SIGNAL'S Deluxe Streamliner. Signal Electric Mfg. Co., Menominee, Mich.*



*COOLAIR Attic Fan by American Coolair Corp., Jacksonville, Fla.*



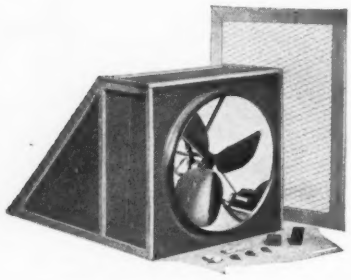
*AUTOVENT'S COOLVENT Attic Fan by Autovent Fan & Blower Co., Chicago, Ill.*



# New Products

## Niteair Attic Fan

The new Niteair attic fan, manufactured by Lau Blower Co., Dayton, Ohio, may be installed in attic or basement for complete home air circulation. Features of this unit include: new streamlined venturi-type entrance housing which assures maximum air delivery with less power required; extremely quiet; three-blade fan, broad and deep pitched producing maximum air volume with reduced power consumption and



air turbulence; the entire assembly is statically balanced; sold as either a fan unit for installation in basement, or outside attic or storeroom wall, or as package unit with vent box for installation over ceiling grille or attic stairway; fire prevention accessories come with package unit; finish is arrow-flint grey; the 30" fan is capable of delivering 7000 cfm; prices as low as $42.50.

## Philco Room Ventilator

Newest Philco engineering achievement is the room ventilator which promises to make history in the electrical appliance field this year. Its reception at dealer meetings just concluded through the country was such that advance orders were more than double expectations, according to Harry Boyd Brown, manager of the air conditioning division.

Its simplicity of design and compact construction are such that it is priced at $39.50. The Philco room ventilator weighs only 26 pounds and can be installed in 30 minutes in the standard double-hung sash window by one man. No special technical skill is required as it starts to operate on being plugged into the socket. It is housed in a handsome walnut cabinet which measures 11 inches in height, 16 inches in width and 14 inches in depth.

In a sense the Room Ventilator is a double-duty unit since it will either bring in fresh, filtered air from outside or clear the room of stale air. As much as 475 cubic feet of clean air can be brought into a room per minute. Or, merely by turning the control knobs on the unit, the room air is exhausted through the ventilator at the rate of 110 cubic feet per minute. In fact, by adjusting the controls, it is possible to recirculate the air and add the desired amount of fresh air in such proportions that one can "blend their own atmosphere".

A specially treated filter extends completely across the outside opening of the ventilator so that all air brought into the room from outside is thoroughly cleaned, insuring freedom from dust, pollen and impurities.

## Emerson Fan Catalog

"Emerson-Electric Fans for 1941" —a colorful catalog featuring the new and improved fans in the entire Emerson line is offered by The Emerson Electric Mfg. Co., St. Louis.

New desk and stand fans—a complete new line of powerful air circulators—improved ceiling fans—a new line of kitchen ventilating fans—twenty-five pages listing, picturing in full color and fully describing approximately a hundred models. Detail construction features, performance and prices are given for all models. A copy of the catalog (No. X4049) will be mailed to those requesting it on their company stationery.

## Victor Revolvaire

Outstanding in the new Victor fan fixture line is the Revolvaire, which is manufactured in three models by the Victor Electric Products, Inc., Cincinnati, Ohio, makers of a complete line of circulating fans, motors and In-Bilt ventilators.

All three Revolvaire models are equipped with the "Flexaire" Breeze Director, which revolves with the breeze, spreading the air currents downward and upward to all parts

of the room. The Revolvaire eliminates harsh drafts and assures complete air comfort. It can be used to especial advantage in restaurants, stores, hotels, offices, and the like.

For further information regarding the Victor Miracle Breeze line write Victor Electric Products, Inc., 2950 Robertson Road, Cincinnati, Ohio.

## Delco Northeaster Fan

A new low-priced line of Delco Northeaster Ventilating Fans in 10 and 12 inch sizes of both wall box and window panel types have just been introduced by the Delco Appliance Division of General Motors Sales Corporation, Rochester, N. Y.

These low priced 10 and 12 inch panel and wall box fans are built in the non-reversible types. The new 10 inch models are equipped with the latest type semi-wide blades. The motors are completely redesigned with streamlined cases with guards finished in attractive Cadmium plate. The wall box is of an entirely new, cylindrical type, made so that it can be extended from 5¼ to 13½ inches. The fan and motor are mounted on an attractive ivory finished grill so designed that by removing two knurled nuts it will swing down out of the way so that the fan and wall box can be readily cleaned.

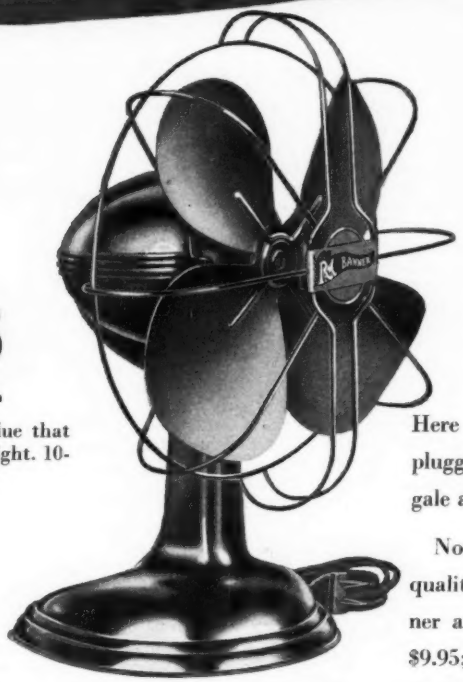
A pull chain operates the "start and stop" switch and at the same time opens the outside door. When the fan is stopped this door is firmly closed so that it keeps out all cold, snow or rain. The twelve inch model wall box is square in shape, has an inside door, and has fixed outside louvres. It may be adjusted from 8 to 15 inches.

## Signal Air Circulator

A new line of air circulator fans is announced by Signal Electric Mfg. Co., Menominee, Michigan, in floor, low stand and wall models—sizes 20" and 24"—three speeds, chrome plated and adjustable, incorporating the important vertical plane adjustment feature, illustrated in fan here, that permits the fan to be turned from horizontal to vertical position at 15 degree angles. Other features are polished aluminum blades designed for maximum air delivery and quiet operation, motor with heavy

# BEAT "Price Competition" with PRICE-PLUS-QUALITY

# R & M BANNER FANS



**$9.95 RETAIL**

Here's a fan value that will *sell* at first sight. 10-inch, oscillating.

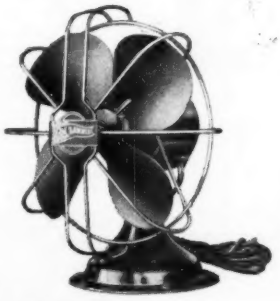
Here they come—the greatest *quality-beauty-price* values ever plugged into the fan-sales circuit. Watch 'em stir up a profit gale and blow new customers your way.

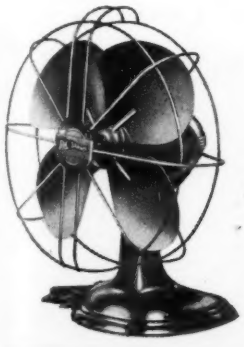
Now you can meet price competition without sacrificing quality. Match, if you can, the sensational 8-inch R & M Banner at only $3.95 retail; this 10-inch oscillating beauty for $9.95; or this 12-inch two-speed oscillator for $17.95! All with powerful motors, wide, quiet, vibration-free blades; smart streamlining and rich brown finish.

Get set now for a "Banner" season! See your distributor—and write today for the new R & M Fan Catalog showing the *entire* line of R & M profit-makers.

**$3.95 RETAIL**

The quality leader in its price class. 8-inch, non-oscillating.





**$17.95 RETAIL**

This fan has *everything*—at a price that *beats* everything. 12-inch, 2-speed oscillating.

**NEW R & M FAN CATALOG READY**

***Get your copy!***

Packed with fan values from cover to cover, the new R & M catalog is your guide to 1941 profits. It includes illustrations and descriptions of De Luxe Fans, Heavy-Duty Commercial Fans, Air Circulators, Ceiling Fans, Portable Home Coolers, Attic and Exhaust Fans. Write *now* for your copy.

**ROBBINS & MYERS • Inc.**

SPRINGFIELD, OHIO • FOUNDED 1878

gauge drawn steel housing inside of drawn steel streamlined outer housing, with rubber mountings between them. The motor has ball balance thrust when it is operated in vertical position.

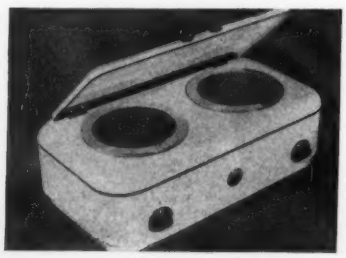
### Wagner Air Circulator

Wagner announces a new air-circulator for 1941. Improved in both appearance and performance, the 1941 model has wide, quiet-type blades, and a highly efficient, 2-speed, induction type motor. Available in 24" or 30" size.

New 1941 Wagner fan catalog has just been released. It illustrates and fully describes the complete line of Wagner cooling and ventilating equipment for 1941. This 20-page catalog also contains installation and application data, making it especially helpful to dealers and contractors using it as a sales manual. Write direct to Wagner Electric Corporation, 6400 Plymouth Avenue, St. Louis, Mo., for Bulletin FU-41.

### K-M Grill Stoves

Announced as "the stove that will heat the nation's sales", Knapp-Monarch Co., St. Louis, presents the 1941 K-M Electric Grill Stove in five models listing from $19.50 down to $4.95. K-M Grill Stoves are made for use in small apartments, utility use in the large home kitchen, in the laundry, the recreation room, and at the club or holiday cabin or cottage where power is available.



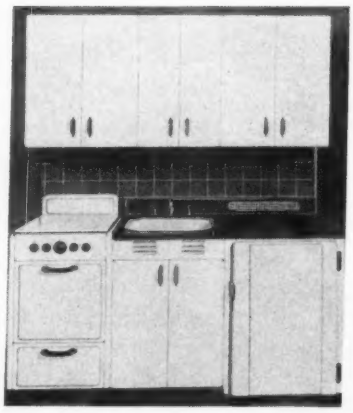
Top of the line is Model 240-0, a two-element portable stove with a hinged cover and splash guard, the whole finished in white porcelain enamel with black plastic cover handle and switches. The two Dur-A-Life embedded elements, a patented K-M development, give any heat up to 1200 watts, with three controlled heats on both elements, low 400, medium 800, high 1200. The embedded element will never warp, provides full surface contact with the cooking vessel, and cools slowly, retaining heat for 30 minutes of simmering. Electrically interlocking switches protect the house circuit from overloading.

### Youngstown Kitchen

Youngstown Pressed Steel Division of Mullins Manufacturing Corporation, Warren, Ohio, is announcing a compact, efficient, steel apartment type kitchen. The unit will be put into mass production which will insure prices far below anything of its type now available.

The new Apartment House Kitchen, No. AP-366, was designed as the result of an insistent demand from the field for a small, complete, steel kitchen ensemble at a price that would permit use in apartments with small kitchens and still fill the demands for storage space, appearance, and quality.

The Apartment House Kitchen is 66 inches in length, including the range. It consists of 3 wall cabinets; a 22-inch special base cabinet with concealed cutlery drawer; a continuous linoleum top with flat rim sink installed.

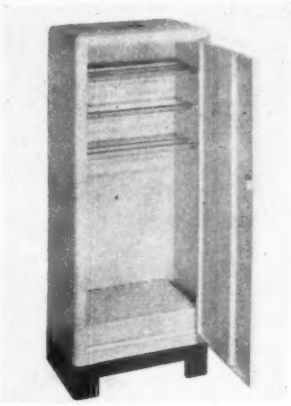


More storage space has been secured in the cabinet by moving the waste to the left rear. A 4-inch splash back with perforated metal strip over the refrigerator allows free circulation of air. Youngstown Pressed Steel does not manufacture ranges or refrigerators, but these appliances are available through local YPS distributors who are equipped to give prices on the complete efficiency kitchens.

For additional information, write Youngstown Pressed Steel Division, Warren, Ohio.

### Hotpoint Promotional Dryer

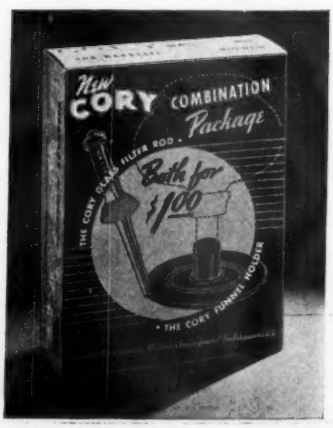
Shown here is Hotpoint's new promotional dryer. Designed primarily for use in the bathroom, it can be plugged into any light socket. A Calrod unit sends heat over the articles hanging on the wooden cross-



bars. Baby clothes; damp towels and washcloths; underthings—all of those items that must be dried from time to time throughout the week—can be hung away and dried, out of sight. This dryer is available at astonishingly low cost, to Hotpoint retailers only, to help them promote Hotpoint home laundry equipment.

### Cory Accessory Combination

Two of the patented features supplied with all Cory Glass Coffee Brewers—the Cory Glass Filter Rod and the Cory "Safety Stand" Funnel Holder—are now being offered together in an attractive package at one dollar retail. The Cory Rod fits most glass brewers, both wide and narrow neck styles. Makes them all glass and simplifies operation. The Cory Funnel Holder provides a convenient and safe stand for holding the upper glass of any glass coffee maker, either at the table or for storage in between times. As an extra value, there is included in each package a Cory Bakelite Coffee Measure that's handy also for other uses.



# A Simple Idea? Sure

## IT'S PRACTICAL And -- SALES-WORTHY

*Point Out The Facts . . . And 10 to 1 You'll Make a Sale!*

Here's one of the most popular ideas in summer comfort that ever hit the market! It's effective—it's economical—it takes home cooling equipment out of the luxury class!

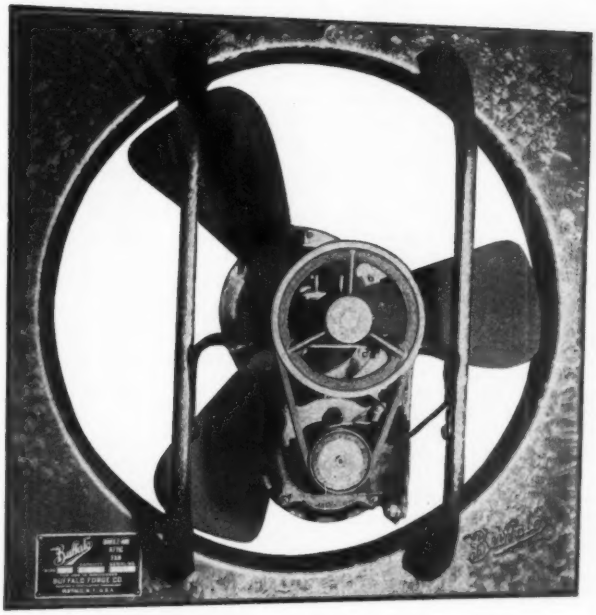
With a *Breez-Air* Fan installed in the attic practically every home can enjoy the comfort of modern cooling throughout the sultry summer months.

The diagram (lower right) shows at a glance how the *Breez-Air* Fan does the job. Operated after sundown, it pushes out the accumulated hot air, draws in cool night air, provides the most economical air cooling money can buy!

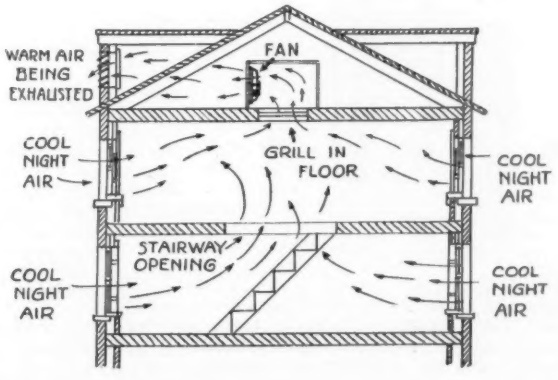
Buffalo *Breez-Air* Fans are quality-built down to the smallest detail, so quiet in operation and so economical. Cash in on this popular home cooling idea! Your market is unlimited! Better write or wire today for full details.

BUFFALO FORGE COMPANY

210 Mortimer St. Buffalo, N. Y.



Above: The quiet-running *Breez-Air* Attic Fan, built for years of service. Below: The simple arrangement that provides comfort cooling throughout the summer months.




"Buffalo" BREEZ-AIR FAN

The Quality Home Cooling Fan

## Norge Night-Watch

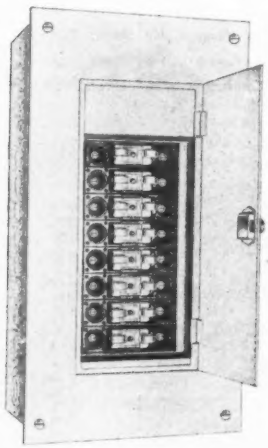
Offering fully automatic defrosting for the first time in domestic refrigerating history, the Norge Night-Watch brings to housewives a major improvement. It eliminates the most irksome task of refrigerator care, defrosting, and thus makes a strong bid even to women who own refrigerators of comparatively recent manufacture.

Operation of the Night-Watch is fully automatic. Controlled by self-starting electric clock mounted in the front of the refrigerator, the Night-watch mechanism defrosts the Quiet-Flo Rollator Coldmaker every night between the hours of midnight and three a.m. No attention is required, no buttons must be pushed either to start or stop the process.

One of the major advantages which the Night-Watch is proving in laboratory and service tests is a marked increase in efficiency of the refrigerating unit. Daily defrosting prevents the formation of any but the slightest trace of frost on the coils and thus eliminates the insulating blanket of frost and ice which is built up in almost all refrigerators between defrosting periods.

## Wadsworth "NTP" Panels

The Wadsworth Electric Mfg. Co., Covington, Ky., announces the "NTP" panels with "push-pull" switches for individual circuit control, in either flush or surface mounting types. The panels are available in 4 to 40 cir-



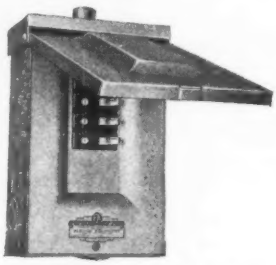
cuits inclusive, as follows: for services, 3-wire and for 3-phase 4-wire; for branches, 2-wire single (plug) fusing; and for switches, snap-action "push-pull" type, 30 amperes, 125 volts, single pole.

Built of (galvanized) steel, with ample wiring space, the box can be installed with main lugs at top or bottom. The removable door trim and dead front is made of steel, finished in durable baked aluminum. The door for panels up to 12 circuits have spring catch; 16 circuits and larger, spring lock and two keys.

The interior block assembly is removable. Each molded composition (switch and fuse) block, has two built-in switches and two plug fuse receptacles, for 2-circuits single fusing. Any block in an assembly can be removed, without disturbing the remaining blocks in the assembly.

## Weather-Proof Enclosures

Load centers and service equipment, used in the open, should be protected from the elements. The (F-A) Raintite Enclosure is for outdoor application in connection with yard lighting, signs, flood lighting and general use. It is impervious to



rain, snow and sleet. The box is of galvanized steel, the cover bonderited to prevent corrosion, all with gray enamel finish. Hinged cover may be padlocked, to prevent tampering. Load centers and service equipment of 2 to 16 circuits, 120 volt, are available as well as large assemblies in panelboard construction, in these weather proof enclosures. For further information write to Frank Adam Electric Company, St. Louis, Mo.

## Flat Bus Bar Clamps

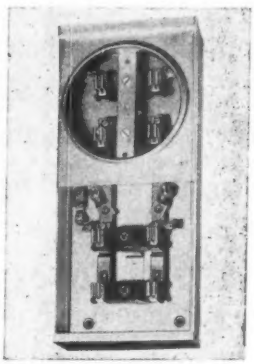
In order to simplify the installation of flat bar bus structures. Burndy offers the type HHV Bus Support Clamp. This clamp supports the flat bar vertically and the same clamp may be used to hold one or more flat bars. If the supporting insulator is slightly out of line with other insulators a "slide track" in the clamp permits compensation so that the flat bar itself remains straight and true, without any stresses thereon tending to distort it. Both of the clamping plates which grip the flat bar are securely fastened to the base so that any short circuit stresses are divided over both parts and are not concentrated on a single supporting part.

The type HHV Bus Support Clamp

is made of high strength aluminum bronze. It is available for any number of bars of 1½ inch to 12 inch width. For further information, write Burndy Engineering Co., Inc., New York, N. Y.

## Socket Meter Troughs

The Square D Company, Detroit, Michigan, has added to its service equipment a line of standardized socket meter troughs, designated as No. 3 and No. 3A. Individual covers for each meter position permit work, on any one meter without disturbing the others. Solderless connectors on the line side will take up to No. 3/0 wire and on the load side up to No. 4/0. No. 3A troughs are provided with disconnects on the load side. The Square D method of accomplishing this is by backing out the screw. Since this is done when the meter is not in place, no current is broken by the screw when disconnecting or connecting. No. 3 troughs are identical to No. 3A except that they are not provided with disconnect means.



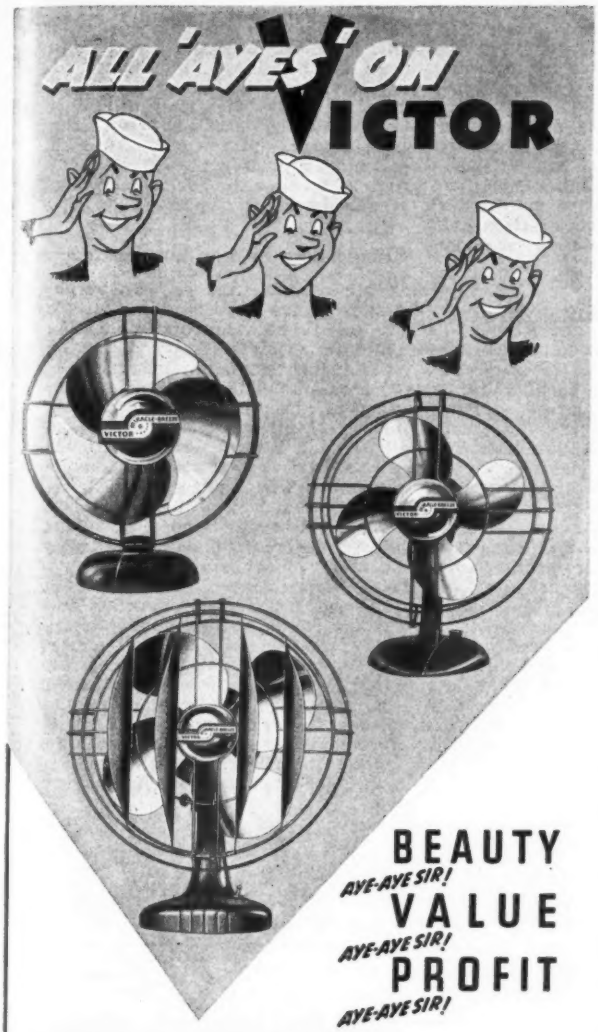
Both types of troughs are furnished either with or without busses, in outdoor or indoor types, and in steel or aluminum construction. The illustration shows a No. 3A outdoor, vertical, two-position trough with one cover removed.

## Switch and Outlet Boxes

All G-E switch and outlet boxes furnished with clamps now have new knockouts, new pryouts, new clamps, and cable clamping ribs which save space and make wiring easier, it has been announced by the General Electric construction materials division, Bridgeport, Conn. Catalog numbers and prices remain the same.

The new knockouts are horse-shoe shaped, permitting cable to lie flat on the bottom of the box, thus saving space and protecting cable. New pryout slots are scientifically located for easy use. The removal of knockouts is possible even after a box is installed.

New clamps are provided for "BraidX" in the SP26625 series of shallow round outlet boxes and in switch boxes. They provide more wiring space and eliminate completely all sharp edges.




BEAUTY
AYE-AYE SIR!
VALUE
AYE-AYE SIR!
PROFIT
AYE-AYE SIR!

VICTOR
"MIRACLE BREEZE" Fans

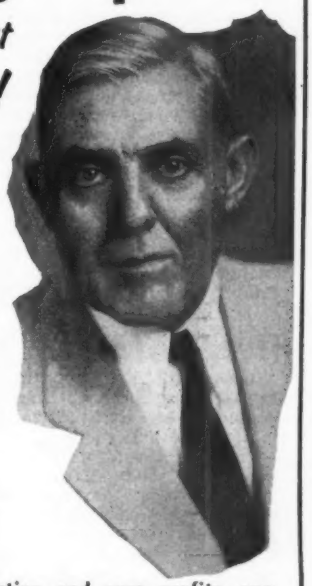
COOL COMFORT UNDER CONTROL

You owe it to your cash register to see the new beauty line of Victor Fans. Sales appeal, built in by one of America's foremost designers – modern construction features fashioned by Victor engineers. 6 new table models, 4 of them with the exclusive Flexaire Breeze Director. Write today for new catalog and full details.

VICTOR ELECTRIC PRODUCTS, Inc.
DEPT. J-3103 2950 ROBERTSON AVE. CINCINNATI, O.

ASK YOUR JOBBER
Write today

For SURE PROFITS in Attic Fans you can't beat COOLAIR!



THAT'S the frank opinion of Mr. A. L. Swanson, president of Swanson-Nunn Electric Company, Evansville, Indiana, well known electrical contractors and appliance dealers.

"I've handled all kinds of attic fans," says Mr. Swanson, "but for quiet, trouble-free service, genuine customer satisfaction and sure profits, you can't beat Coolair. Enthusiastic customers help you sell more fans and make more profits."

New, improved Coolair Home-Cooling Fan — all-steel construction, patented sound-absorbing springs, streamlined inlet.

Other smart electrical dealers from coast to coast will tell you the same thing. *Your profits are yours to keep* when you sell Coolair fans because you don't have costly trouble calls to eat up those profits.

Coolair's New Attic Package, complete with fan and automatic ceiling shutter, greatly simplifies installation.

Get on the Coolair bandwagon now and enjoy a profitable ride this summer. FREE illustrated catalogs, direct mail pieces, local newspaper ad mats and other sales helps are ready for you. Write today for details and franchise information.

MAIL THIS COUPON TODAY!

American Coolair Corporation,
Jacksonville, Florida

Please send me information on the complete line of Coolair fans.

Name _____

Address _____

City _____ State _____

Coolair Ventilating and COOLING Systems
AMERICAN COOLAIR CORPORATION
Manufacturers . . . . JACKSONVILLE, FLORIDA

### Industrial Wiring System

Development of a new series of fittings now makes it possible to use standard No. 3000 Wiremold wiring channel as a group circuit feeder raceway for wiring to light and power circuits in factories and also as an industrial type of multiple outlet system at work benches, etc. for connecting portable tools and appliances. These new fittings include No. 3000 W. C. wire clip for holding wires in the raceway, No. 3007A mounting strap for use with any standard device having plaster ears and in combination with standard flush plates. The No. 3046 cover is for fastening 50 amp. twistlock receptacles. For further information, write to The Wiremold Co., Hartford, Conn.

### Glass Cloth Insulation

Glass cloth, impregnated and coated with heat resisting varnishes developed especially for this purpose, is now available for use as insulation by manufacturers of electric motors, generators and similar equipment. This new insulation material, known as Irvington Varnished Fiberglas, is furnished in fullwidth rolls and tape of various widths and thicknesses by the Irvington Varnish & Insulator Company, Irvington, N. J.

The material consists of a woven glass cloth base (Owens-Corning Fiberglas) impregnated and coated with a special varnish which greatly increases its resistance to abrasion, impact, and increases its overall mechanical strength. The resulting material has much higher insulation resistance and much greater ability to withstand heat than other flexible insulations, thus enabling manufacture of lighter, smaller motors for any given horsepower rating and safer operation of these motors under continued overloads.

### New Fluorescent Luminaires

A new fluorescent luminaire employing two of the recently announced 100 watt, 60-inch, white, or daylight fluorescent lamps, and designed especially for general and supplementary high-level illumination in industrial or commercial areas is announced by the Westinghouse Electric & Manufacturing Company. This new 2-FPR-100 luminaire, is ideal for supplying the high intensities needed in plants where production is being speeded. They are available for operation on 110-125, 199-216, and 220-250 volts, 60 cycle, a-c.

Fixture consists of a hood, reflector, lamp holders, starting device, and ballast equipment. Access to line connections is easy as all auxiliary equipment is mounted and wired as part of the sheet steel hood assembly. Reflectors are 18 gauge porcelain enameled steel. Two types are available; the direct type which throws all light downward, and the diffuser type which allows a minimum of 2½% upward light to pass through apertures above each lamp to reduce brightness contrast between the lighted area and the ceiling. Both reflectors provide a 14 degree shielding angle below the horizontal, when viewed normal to the lamps.

### Chromalox Immersion Heater

Edwin L. Wiegand Co., Pittsburgh, Pa., has announced a new complete line of tubular immersion heating units in diameters from 5/16" to 1/2" inclusive, and in lengths from 12 inches to 8 feet. These tubular elements are used extensively in water, oil, air and molten metal and molten salt heating; are constructed with a helical coil of nickel chromium resistance wire, imbedded in a refractory material, which is encased in a metal tube. Copper, steel and special high temperature alloy sheathing for operating at a maximum temperature of 1200 degrees F. are used, based upon operating conditions of the heating application.

Type TUH immersion heater, used for coffee urns, steam tables and similar conditions represents one of the many versatile units of varying design in which straight, bent or formed units are provided when requested, with suitable threaded fittings, gaskets and lock nuts.

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## To Sell Water Heaters— First Sell Hot Water!

(*Continued from page 23*)

tact with our users pays good dividends. Our customers are our best source of water heater prospects. Sometimes, when we consider it helpful in closing a tough deal, we ask permission to show an installation we already have made.

"Given reasonable advance notice, customers usually are whole-heartedly cooperative. In many cases, they make stronger claims for the efficiency of our product than we do. And what they say carries vastly more weight with the prospect than anything we can tell him.

"Speaking of 'cooperation', I would like to emphasize the advantages to the electrical appliance dealer of working with his local utility company. Naturally, the utilities primarily are interested in selling current. In many respects, their interests and the dealer's are identical. And so if the latter shows a disposition to work with the company, he will find that its personnel will go a long ways to help him in his sales efforts.

"Data compiled by the utility's technical staff will be made available to him. Too, he may receive other useful information that can result in bigger and better sales.

"Besides home-owners, the small-capacity heaters have put apartment-dwellers onto the prospect list. The same is true of tourist-camp operators. Here, better accommodations easily can command higher rates from patrons.

"Commercial users expand the market still further. We have sold to beauty shops, barber shops, restaurants and bars.

"While it is mainly a sectional problem, the average housewife's urge for 'just oodles' of hot water has shunted a great many South Florida home-owners into a dependence on solar-type water heaters. A few cloudy days, plus unexpected house-guests, dispels the belief that the sun can be relied upon as a day-in-day-out substitute for artificial heat, as far as hot water is concerned.

"I recommend that dealers, who are troubled by solar-heater competition in homes where that type of heater already is installed, hook up the solar system, as a tempering tank, to the type of electric heater that particular family should have. By this method, the home-owner can retain whatever economy there may be in solar heat. It also answers the otherwise difficult question: 'What shall I do with my solar heater?'

"The same idea will work in other parts of the country where water is heated by a central home-heating plant. In that case, a tempering tank is installed as close as possible to the heating plant. The water in the tempering tank is raised from ground temperatures to cellar warmth or better before it goes to the electric heater.

"If properly presented, home-owners, as a rule, are quick to see the ecomony angle in either of these arrangements, plus the advantages of a uniform, year 'round hot water supply."

In the past two years, Mr. Cooper has sold over 300 electric water heaters. During the 8 weeks previous to this writing his sales totaled 60 units. Besides himself, his selling organization consists of four salesmen. One service man covers the needs in that part of the business.

### Fluorescent Window Units

A new line of Fluorescent Show Window Lighting Units designed specifically to meet the exacting merchandising standards of today are now marketed under the established Curtis "X-Ray" trademark. A five-foot size utilizes two of the new 60" fluorescent lamps. The smaller three-foot size mounts four 36" lamps —two lamps are placed one above the other in each reflector in order to obtain the same lighting intensity per foot as obtained with the five-foot size. In both sizes the unit has two asymmetric reflectors which direct the light down on the important display area.

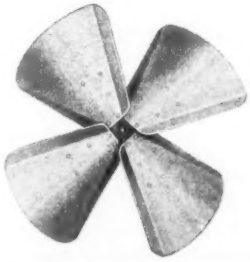
Provision has been made for recessing into the ceiling and also for installing units end-to-end in continuous lines or side-by-side. This equipment can be obtained both with or without louvers as desired. The larger size has a 325-watt rating and the smaller size a 150-watt rating. The two Alzak aluminum reflectors in each unit have a highly polished permanent finish. For further information write Curtis Lighting, Inc., Chicago, Ill.

### Mercury Midget Switch

An extremely small mercury switch measuring only 7/16" long by ⅜" diameter has recently been announced by Littlefuse, Inc., 4748 N. Ravenswood Avenue, Chicago, Illinois. This switch is designed for use in low voltage circuits up to 25 volts a-c or d-c, and currents up to 10 amperes at 6 volts and 3 amperes at 25 volts. There is no friction or wear in operation, and no maintenance of attention is required. The durable metal and bakelite body contains the mercury. A newly designed baffle device assures a positive "make or break" operation, with no opportunity for a flickering action when equipment is jolted. This switch is designed to fill the need for an inexpensive, reliable switch for thermostat circuits, pin game machines, automobile glove compartments, etc.


*The* **FRESH-AIR MAKER**

● Designed to give you a fast selling fan of high quality construction and fine appearance—Fresh-Air Makers are beautifully balanced, quiet and efficient in operation yet competitively priced—30", 36", 42", 48" diameters.



Or you can simplify your job if you build your own fans by the purchase of a proven, standard fan blade —individually packed—carefully balanced—three or four bladed type in 30", 36", 42", 48" diameters.

Write for further details and prices.

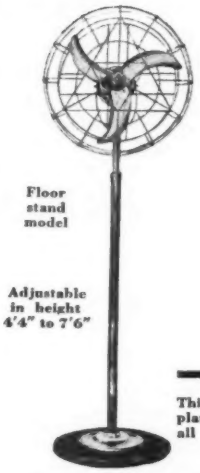
BLOWER DIVISION
SCHWITZER-CUMMINS COMPANY
125 FAN STREET INDIANAPOLIS, U. S. A.

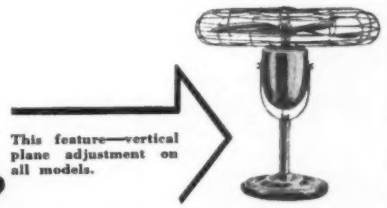
**NEW**

**20" and 24"**
**AIR CIRCULATOR FANS**

**Popular sizes. Popular prices. Floor, low stand, and wall models.**

From any manner of appraisal—appearance, design, air delivery and construction, these Signal 20" and 24" chrome plated air circulator fans have instant appeal—and are exceptional values. Features in addition to vertical plane adjustment include 3 speed operation, specially designed fan blades for maximum air delivery and quiet operation. Write for complete specifications and prices.




*Also a complete new line of streamlined desk fans. Send for new 1941 catalog now.*

SIGNAL ELECTRIC MFG. CO.
MENOMINEE, MICHIGAN

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*Do You Know ?*

the proper method of making connections for a polarity test on a three-phase delta connected stator? How to lay out armature windings of the split-loop type? The theory of operation and the many types of circuits utilized in capacitor-type split phase motors? Methods of reversing rotation of a-c and d-c motors? How to eliminate brush troubles? Select the best type of varnish?

The answers to these and many other practical problems on motor repair will be found in Jack Beater's book

**"Motor Rewinding and Testing"**

SPECIAL OFFER—"Motor Rewinding and Testing" may be obtained with a 3-year subscription to ELECTRICAL SOUTH for $2.50 or a 5-year subscription for $3.50. Take advantage of this special offer while it lasts. Write today to

ELECTRICAL SOUTH, Grant Bldg. Atlanta, Ga.

**COOLVENT *Attic* FANS**

KEEP HOMES COMFORTABLE

25 YEARS OF LEADERSHIP GIVES

● Low Cost Operation ● Operates Quietly
● Precision Built ● Certified Protection

CERTIFIED RATINGS

MEMBER OF NAFM

DISTRIBUTED ALL OVER THE SOUTH! Some Distributor Territories open. Member National Association of Fan Manufacturers.

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AUTOVENT FAN & BLOWER CO.
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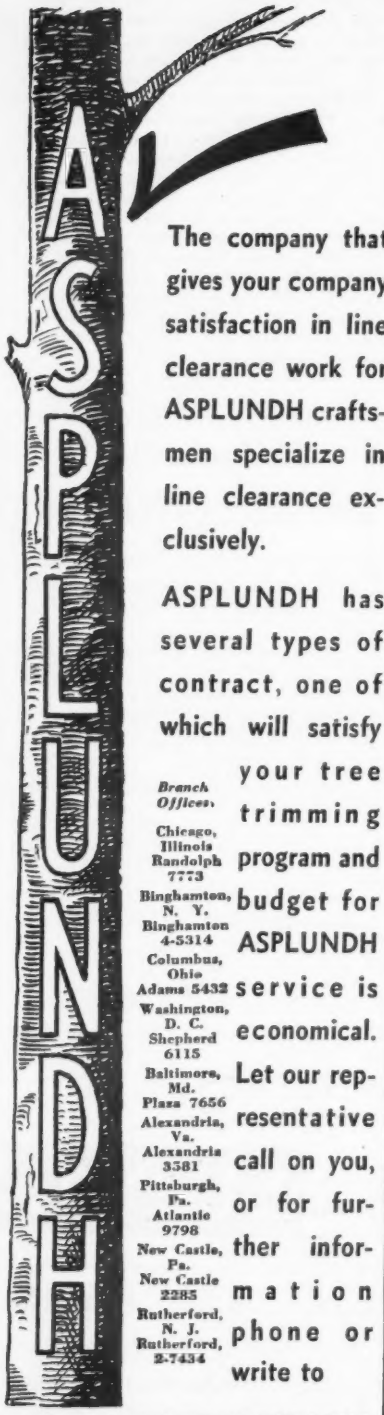
AUTOVENT 25th ANNIVERSARY




The company that gives your company satisfaction in line clearance work for ASPLUNDH craftsmen specialize in line clearance exclusively.

ASPLUNDH has several types of contract, one of which will satisfy your tree trimming program and budget for ASPLUNDH service is economical. Let our representative call on you, or for further information phone or write to

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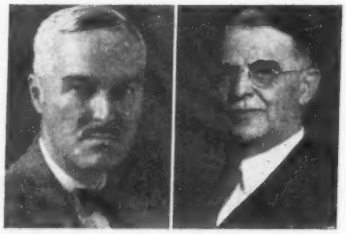
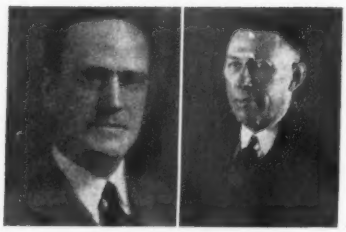
TREE EXPERT COMPANY
*Jenkintown, Pennsylvania*
OGONTZ 3750
*Line Clearance Exclusively*


# News About People

Election of four executives to the rank of vice president is announced by **A. W. Robertson**, chairman of the board, Westinghouse Electric & Manufacturing Company.



**A. C. Streamer** **Bonnell Clark**



**F. D. Newbury** **R. A. McCarty**

They are **Bonnell W. Clark**, of New York, now president of the Westinghouse Electric Supply Company, a subsidiary; **R. A. McCarty**, of Philadelphia, manager of the Steam Division; **Frank D. Newbury**, of Pittsburgh, manager of the Emergency Products Division; and **A. C. Streamer**, of Pittsburgh, general manager of the East Pittsburgh Division.

All the new vice presidents have been identified with Westinghouse for many years.

* * *

**Leonard K. Black** has been appointed sales representative for General Electric wiring materials in Tennessee with headquarters at Nashville. This announcement was made by **R. R. Morgan**, General Electric district manager of wiring material sales at his office in Atlanta, Ga. Mr. Black will work with distributors of G-E wiring materials including the Kingsport Electric Co., at Kingsport, and General Electric Supply Corporation houses at Nashville, Memphis, Knoxville, and Chattanooga, Tenn.

**L. K. Black**

* * *

**Claude J. Hendon** has been elected vice president and general manager of Schick Shaver Service Corporation, subsidiary of Schick Dry Shaver, Inc., it has been announced by **Ralph J. Cordiner**, Schick president. Mr. Hendon was vice president in charge of sales and a director of the Silex Company, of Hartford, prior to joining Schick.

Mr. Hendon began his business career with the Georgia Power Company, of Atlanta, Ga., in the sales division. In 1927, he joined the Edison General Electric Company as a member of the Atlanta sales staff. He transferred to the appliance department of General Electric in 1932 and became Atlanta district manager for that company. In 1934, Mr. Hendon was brought to Bridgeport by the General Electric Company and became general manager of the heating device department and chairman of its management committee.

**Claude J. Hendon**

* * *

Appointment of **J. H. Rasmussen** as manager of the radio division of The Crosley Corporation has just been announced by **Robert I. Petrie**, vice-president and general sales manager of the Corporation.

For the past five years, Mr. Rasmussen has been assistant sales manager of the Zenith Radio Corporation, of Chicago. Previously, he had served for four years as advertising manager and assistant sales manager of the Grunow Corporation, later the General Household Utilities Company, of Chicago.

## Checking the Capacity Of Condensing Units

(*Continued from page 36*)

the cross and solder both at the top and bottom connection. Also, close the bottom of the tube. This can

be done by flattening and soldering over the bottom.

Water can now be placed in the well and with a regular pocket thermometer inserted, a reading of the temperature of the incoming water can be made. The temperature of the outlet water must also be measured, so a thermometer well is installed in the outlet line just outside the cabinet. The amount of water flowing through the coil must be known and this can be done by using a one gallon measure to check the flow per minute. A compound gauge should be installed in the suction line, or low side, of the compressor to be checked. Also install a thermometer well in the suction line so that the temperature reading of the suction gas can be made about three feet from the compressor. The head pressure should always be determined and held normal, consistent with load, by checking the temperature of the cooling medium with a thermometer and then referring to the manufacturers specifications at that temperature. If water cooled, the temperature of the condensing unit cooling water must be known.

### Conducting the Test

With the connections all made, they should be checked as if it was a permanent refrigeration job. Evacuate the system in order to remove any air or moisture. Open the valves on the machine and it is ready to be checked. Start the machine and set the expansion valve at the back pressure at which it is desired to know the capacity of the compressor. The inlet water valve can now be opened and the flow of water adjusted until the temperature of the refrigerant in the suction line at the thermometer well is 65 deg. F. The unit should be run for about thirty minutes in which time the system should stabilize itself or compensation can be made in the flow of water or expansion valve adjustment in order to insure the desired operating condition. Record the flow of water per minute and the suction and head pressure. The load on the condensing unit can be calculated in B.T.U. per hour by dividing 60 by the time in minutes for one gallon of water to flow through the tester and multiplying this value by 8 1/3 times the temperature drop in deg. F. of the water flowing through the tester.

This is expressed by the following formula:


# WHERE AND WHY
## CENTRAL STATIONS USE G-E 227 SEALING AND FILLING COMPOUND

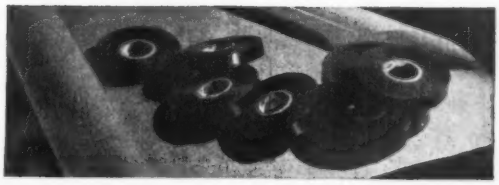
**WHERE**

For filling cable end bells
For filling cable joints
For filling coupler sockets
For filling potheads

**WHY**

It flows easily and smoothly at the recommended heating temperature.
It's highly resistant to moisture.
It has a high dielectric.
The balance doesn't deteriorate between heatings.
It remains semiplastic where it's poured and is easy to remove if necessary.

There's a free copy of this large, complete, G-E Insulating Materials Catalog waiting for you. Just write to Section M-1163, Appliance and Merchandise Department, General Electric Company, Bridgeport, Connecticut.



G-E 992 Varnished Cloth Tape

This tape is easy to work with because it's so flexible. It gives maximum insulating protection due to its high dielectric strength. G-E 992 Tape is moisture- and age-resistant. These qualities mean longer trouble-free operation to you on jobs where this tape is used.

GENERAL ELECTRIC

# Sherman CONNECTORS

Sherman solderless wire connectors and clamps are practical, efficient, easy to install, and surprisingly moderate in cost. Every item has been designed and built to meet the specific needs of the Electrical Industry.

You can cut costs and reduce inventories by standardizing on Sherman. Prompt delivery from large stocks.

Today's finest Split Bolt Connector. Precision machined from high strength corrosion resistant bronze.

Wedge Grip Connectors that provide extra wedging and snubbing action. Pure copper, non-removable screw.

The popular "Bond-Rod" ground clamp for driven ground rods. Heavy extruded bronze. Bronze screw with cup point. Strong one-piece construction.

Heavy ribbed parallel groove clamps for jumper, tapoff, service or other wire connections. Made in a range of types, for Copper, ACSR or Galvanized Steel Strand connections.

New type Armor Rod Clamp for making tapoffs over ACSR Armor Rods. Unique interlocking construction. Quickly installed without removing bolt.

*Free* New Catalog and Samples

H. B. SHERMAN MFG. CO.

26 Barney Street

BATTLE CREEK, MICHIGAN


**Capacity in Btu per hour**
**$= (60/X) \times 8\text{-}1/3(T_1 - T_2)$**
where:

**X = time in minutes for one gallon of water to flow through tester;**

**$T_1$ = temperature of inlet water in deg. F.;**

**$T_2$ = temperature of outlet water in deg. F.**

The accuracy of the test will depend to a large extent upon having the tester well insulated, including the expansion valve. The thermometers will give more accurate readings if the thermometer wells are wrapped with hair felt or some other such insulation.

## "Opening Wedge" Sells Electric Cookery

*(Continued from page 25)*

side eating houses call for figures on electric equipment before their plans are completed and this gives the department a chance to really "go to town," since the whole outfit can be included in the blueprints. More efficiency as to location, fewer steps for the cooks, and speed of serving can be incorporated in a kitchen when it is to be new from the ground up.

After three years of promotional work, several of the largest food purveyors in Tampa, a city of more than a hundred thousand people, are preparing their food electrically, and many installations of electric cooking equipment have been made in the past year. When Maas Brothers Department Store, one of the foremost stores in the South, remodelled its large building, it changed from gas to electric cookery. Complete electric kitchens have been installed in the Floridan Hotel, the Tampa Yacht and Country Club, several schools, cafeterias, and many other places.

The Tampa Yacht and Country Club has a splendid barbecue pit on the outside for use with wood fuel, yet they were shown that it is more convenient to take a large electric grill out to the barbecue pit and use electric cooking for their barbecues.

Another advantage of using the fry kettle as the opening wedge is the fact that it can be used in so many places. Sales can be made to drug stores, cafeterias, roadside stands, all lunch counters. In any place where food is served, the fry kettle can be used and there it can be a busy little bee continually proving the efficiency, economy and goodness of electric cooking.

A sales point sometimes overlooked in promoting the sale of commercial electric equipment, particularly to drug store food counters and other places where the food is prepared in view of the public, is the showmanship. Customers like the shiny efficiency and speed of electric cooking equipment and enjoy watching it being used.

The following are some of the sales points used so successfully by Mr. Leach in selling the fry kettle, the "opening wedge" to complete commercial electric cookery:

Electric fry kettles maintain accurate temperatures, at any frying range temperature from 250 to 400 degrees. Each type of food can be cooked at its proper temperature.

Electric frying brings new customers and keeps the old ones because electrically fried foods have better flavor, the result of keeping grease out of the food.

Electric frying saves frying compound; gives it longer life and usually requires less in the first place.

With electric frying, waste leftovers are more easily converted into profitable specials.

Inexperienced help can run an electric fry kettle and operation is not hazardous. There is no danger of fire, overheating, smoking or burning the food with consequent loss. It does not require full time attention.

Electric frying is modern and geared to the pace of modern methods and operations.

Electric fry kettles have cut costs as much as 50 per cent in some instances.

Steak and hamburgers can be broiled or grilled electrically so as to retain all the goodness in them.

## Refrigeration Use in Southern Industries

*(Continued from page 29)*

ing the benefits resulting from its use.

Water from limestone wells is essential in the production of the recognized superior Southern Bourbon. Consequently, plants were installed only in locations in which such water was available in large quantities. Naturally when cooling was required, the excess water was put to use and for many years considered satisfactory.

Two objections to the use of limestone water as the cooling medium were apparent:

1. The mash and the slop entering the fermenting tubs could not be cooled to sufficiently low temperature with the available 60 to 70 F. water available. As a result there is an excessive rise in the temperature of the whiskey beer during the fermenting period. This causes the sugar content to burn with a resultant loss in whiskey yield. Also, there is a change in flavor of the finished product due to the chemical changes involved at the higher temperatures.

2. The use of limestone water through mash and slop coolers, because of the temperature difference, forms an incrustration on the heat transfer surface, thus reducing the rate of heat removal which slows up production.

Using treated water mechanically refrigerated as the cooling agent has elminated these troubles. Now, the temperature of the mash and slop entering the fermenting tanks is held at the desired predetermined point resulting in maximum yield of a uniform high quality product, and the production proceeds at a constant rate.

### Carbonated Beverage Bottling

Ice cold soft drinks are "cold" when we buy them and consequently are unconsciously associated with refrigeration. However, the buying public little realizes that the very first step in its manufacture requires that it be as cold in the manufacture as it is weeks later when it is sold over the counter.

To get the uniform product demanded by the public, carbon dioxide must be injected into the water and syrup forming the beverage when both are thoroughly chilled.

Thus this whole industry depends on refrigeration; first, to cool the product during manufacture; and second, to cool the product at the point of consumption.

Every bottler has a slightly different cycle but all of them start with chilled water. The temperature of this water must be maintained accurately at the degree specified. This temperature may be anywhere between 34 F. and 50 F. depending upon the method used for carbonating and the amount of gas to be held in the bottled product. Regardless of the temperature selected or the subsequent method of carbonation, the water must be chilled rapidly and continuously to the same condition day in and day out.

Upon the successful performance


# STRONG, NEAT CONNECTIONS EVERY TIME!

**When You Use B-M Connectors and Couplings**

*Approved by Underwriters Laboratories*

You welcome the speed and ease that the B-M system puts in your hands. These fittings give you complete, *well finished work* in a hurry—on all average jobs (they're non water-tight).

**Only One Tool Needed!**

Costs you only $1.25 for the patented B-M indenter (½"—handles 80% of all installations). Just two squeezes, and you have a smooth, neat connection. No other tools required. This tool can save you many times its cost on the first job.

**POPULAR**—because it's the SIMPLE METHOD Saves 25% on material, saves 25% to 50% of connecting time. Makes installations quick and easy. Eliminates complications and ends fussing with nuts to tighten.

*Distributed by*

The M. B. Austin Co. Chicago, Ill. — Clifton Conduit Co. Jersey City, N. J. — The Steelduct Co. Youngstown, Ohio — National Enameling & Mfg. Co. Pittsburgh, Pa.
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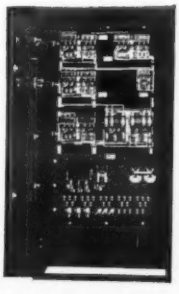
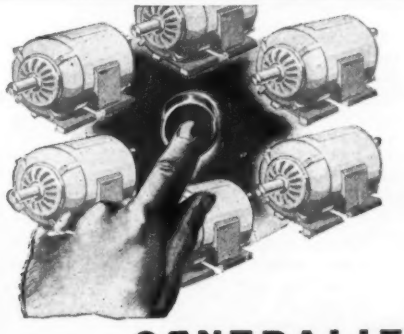
## BRIEGEL METHOD TOOL CO., Galva, Illinois





TYPICAL W. L. Composite Control. Floor mounted, double door type for Boring Mill. Controls 7 motors, all 3 phase, 220 volts, ranging from 1 to 50 H.P. Space available for oil pump and coolant pump starters.

## CENTRALIZED MOTOR CONTROLS

With Ward Leonard Composite Control Assemblies, one or many motors on one machine or individual motors on several machines are conveniently controlled from one central point. Ward Leonard has specialized in building Composite Controls for many years and has studies available for practically every industrial application. This wealth of experience is yours for the asking. Advise us as to nature of the controls you desire and full particulars will be sent to you.

*Southern Representatives:*

John S. Clark, 1100 E. Missouri St., Box 143, Station A, El Paso, Texas — C. B. Rogers, Zahner Building, 1000 Peachtree St., N. E. Atlanta, Ga. — Brance-Krachy Co., 4411 Navigation Bldg. Houston, Texas — Electron Engineering Co. 1811 Masonic Temple New Orleans, La.

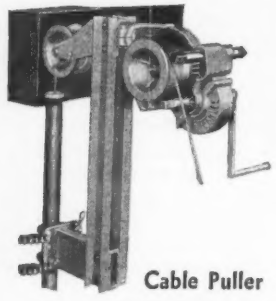
## WARD LEONARD

37 SOUTH STREET MOUNT VERNON, N. Y.

*ELECTRIC CONTROL DEVICES SINCE 1892*

Greenlee TOOLS

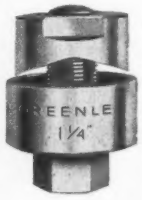
TIMESAVERS and PROFIT-MAKERS FOR THE CONTRACTOR



Cable Puller

No longer is it necessary to use cumbersome, heavy equipment for pulling in cable. The Greenlee anchors right to the conduit through which the cable is to be pulled and is easy to handle and simple to operate.

Knockout Tools




Greenlee Punches and Cutters make it easy to enlarge holes in switch boxes, cabinets etc. They form clean-cut holes quickly and accurately, without reaming or filing.

ASK FOR CATALOG NO. 31E if you don't have a copy. It shows these tools as well as others of interest, such as Hydraulic Conduit and Pipe Benders, Joist Borers, Hydraulic Pipe Pushers and Electricians' Bits.

GREENLEE TOOL CO.
1707 Columbia Ave.
ROCKFORD ILLINOIS

GREENLEE TOOL CO., 1707 Columbia Ave. Rockford, Illinois

Would like information on _____

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☐ Please send a copy of Catalog No. 31E.

Name _____

Street _____

City and State _____

My jobber is _____ ES-3-41

of this duty depends the quality of the product.

### Textile Processing Industry

The story of textile manufacture is one of a series of intricate steps, whether the textile has its origin in the bloom of the cotton field or a thread from the jaws of a giant mechanical spider. These steps are shrouded in mystery for everyone but the manufacturer, due to a combination of secrecy to protect his process and inability of the layman to grasp the essentially complicated steps involved.

Refrigeration and its use is very extensive, but its application cannot be published in detail for these same reasons. Mechanically produced cold is used in the actual manufacture and processing as well as in the better known use of conditioned air for the spaces in which the product is spun into yarn and woven into cloth. The conditioned air assures uniform tension on the thread as they are carried through the steps of manufacture as well as maintaining the correct percent of moisture to give the desired pliability.

### Chemical Processing

Intricate . . . secret . . . comprehensive—the chemical industry is a vast treasure chest from which products flow to enrich our lives with luxuries and prolong our lives with medicine and microbe assassins.

The individual processes using low temperatures are too numerous to list or attempt to explain. The methods of applying the cooling effect at the proper points in the right intensity and under absolute control differ from process to process as much as the products formed.

The application of refrigeration, however, can be classed under two broad headings descriptive of the method employed—direct and indirect. The direct application usually consists of mixing chilled water, ice, or the more recently developed FlakIce Frozen Water Ribbons, with the various ingredients so that as the chemical reaction progresses the heat evolved is instantly absorbed, thus preventing the temperature increasing above allowable limits. The indirect application use chilled water, brine, or direct expansion refrigerant to remove the heat of reaction through the walls of the vessel in which the substances are held. The type of application best suited must in each case be decided after a thorough study of the rapidity with which the heat must be removed and the physical characteristics of the compound produced.

Decidely, refrigeration has proved itself an important and versatile servant to industry and to mankind. Yet . . . marvelous as its world - changing accomplishments have been . . . they are but a hint of what the future of refrigeration holds. Southern industries are springing up . . . producing old established merchandise from different types of raw materials . . . producing new and better articles from accepted raw materials . . . employing new methods of its own developments . . using refrigeration in new and different ways.

---

## Electrically Heated Homes in Knoxville

(*Continued from page 17*)

heat is directly proportional to the size, and will be entirely out of the question with poor construction and in the absence of insulation. It really adds up to this: electric heat is economical only in a home especially built for it.

Many savings are shown to be possible in an all-electric Fondebuilt home. Leaflets distributed in connection with the City Power Board window exhibit explained such savings, as well as gave costs of homes pictured. Here were some of the savings cited:

Base price of a 6-room electrically heated home and lot, $5,000. Monthly payments, $36.

Estimated cost of built-in electric washing machines, $175. Monthly payments of $1.40.

Estimated cost of electric dishwasher and garbage disposal unit, $375. Monthly payments of $3.

Estimated cost of electric range, $100. Monthly payments, 80 cents.

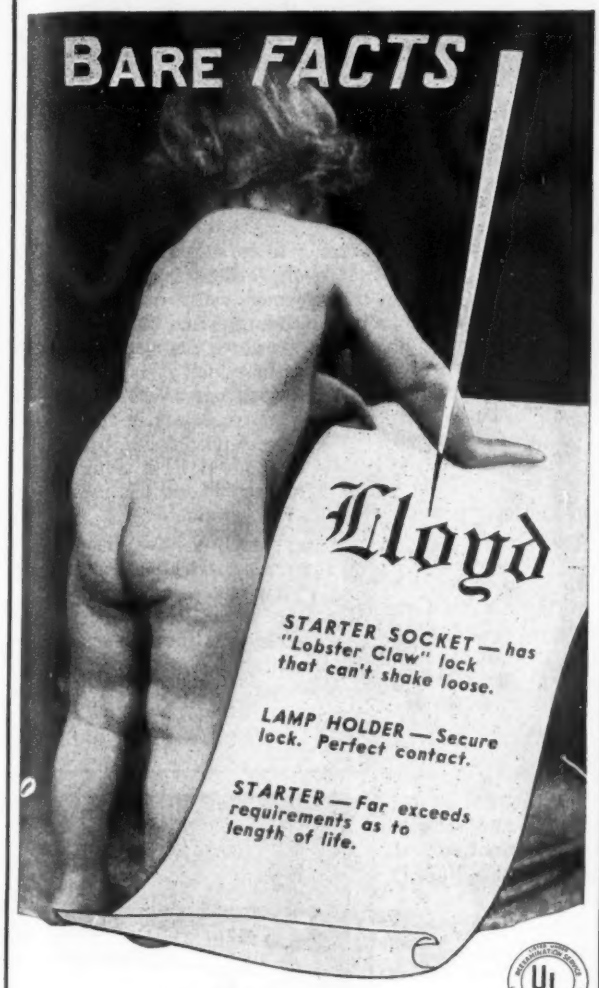
Estimated total monthly costs—$41.20.

"Quite often a servant is needed because of a burdensome laundry, the coal furnace to fire, ashes to handle, the old hand method of washing dishes, taking out garbage, and the necessary cleaning due to resulting dirt, dust and smoke.

"If the above appliances can help you enough to save your servant's costs, your house may cost you nothing.

"Average weekly servant's cost —$7.

"Average amount servant eats —$3.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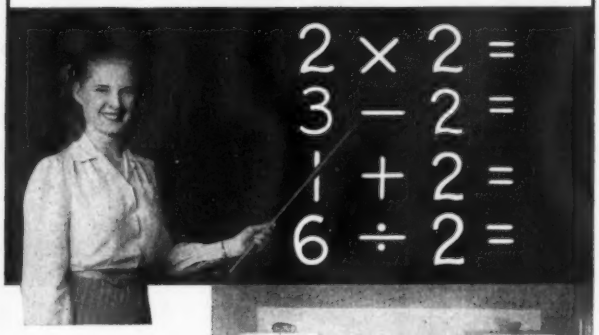



A typical YPS Kitchen installation—enameled steel sink with matching base and wall cabinets.

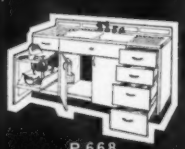
W 2118

W 1830

B D 1836

B 3036

P R 428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YPS

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ADDING a Line reminding you of the "good old days"—YPS Kitchens have high quality, moderate price and an unsaturated mass market.

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"Save on servant for 30 days or one month approximately $43 which will meet your entire house payment.

"If you save half of your servant's cost, you are still ahead."

---

## Electrical Features Of Bankhead Tunnel

(*Continued from page 14*)

lates the fans if the monoxide content increases to over four parts in 10,000 parts of air. Engineers consider less than four parts in 10,000 as negligible. The operation of the analyzer is automatic. Whenever the carbon monoxide content gets over four parts to 10,000, a warning signal flashes on the panel board in the control room of the ventilation building.

Seven pumps have been installed to take care of rain water or any seepage which might occur. Two of these pumps were installed at the Mobile portal to take care of rain water which might fall into the open ramp. Gratings at the entrance of the tunnel also catch much of the rain water which would have a tendency to flow toward mid-tunnel. Two additional pumps have been installed in the ventilation building to take care of similar situations arising on the Blakely Island side of the tube.

The three remaining pumps have been located in mid-tunnel, the lowest point in the tube. Two have a capacity of 200-gallons per minute and are operated by 20-horsepower motors, while the third has a 50-gallon per minute capacity and is operated by a 5-horsepower job. Should there be any seepage through the steel hurricane gates installed at the Blakely Island entrance they will be available to meet the emergency. All the pumps have been adjusted to the heaviest rainfall ever recorded in Mobile.

All pumps are automatic in operation and when the load gets too heavy for one pump, another is switched in. The pumps can also be worked from the control board.

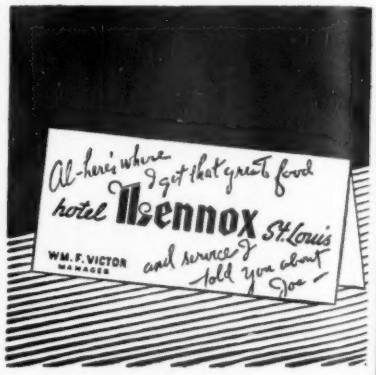
Passenger and freight traffic share the tunnel with traffic of another kind. Through conduits of Johns-Manville Transite in the walls run 70,000 feet of wires and cables carrying electric power and communications. This type of conduit was used because it is incombustible, immune to electrolysis, unaffected by moisture or heat and highly resistant to acids and alkalies which frequently attack many other materials. High thermal conductivity facilitates rapid dissipation of heat from the cables.

Electricity is carried to the ventilation building via two feeders—one from Mobile and the other from Blakely Island. This was decided upon in order to eliminate as far as possible any chance of having power to the tunnel shut off by outside interference. Each of the 4150-volt feeders is extended to a transformer vault in the ventilation building. Six 200 kva transformers reduce the voltage to 460 volts, after which it is distributed to the switchboard, where it is sent out to various points in the tunnel.

Electricity used for lighting purposes is shunted off to four 25 kva transformers where it is reduced to 208 and 120 volts.

Arrangements have been made on the main switchboard so that if one of the feeders go dead the entire load is shifted to the other and carries out the full operations of the tunnel.

However, to be certain that the

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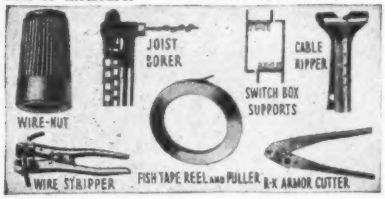


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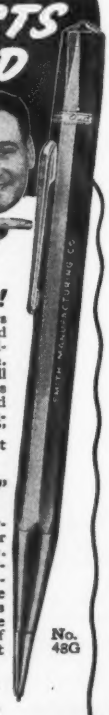

No. 48G

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Autopoint Company, 1826 Foster Ave., Chicago, Ill.


tunnel will have power at all times three different sources have been provided. In case both feeders go out, there is a gasoline engine which drives a 75 kva generator. It was estimated this would supply sufficient power for half the tunnel lights, operate the traffic lights, all the pumps in case of emergency, and run two of the fans at low speed which would be ample to take care of any traffic in the tunnel at the time.

Then there is a battery of sixty storage cells which could be depended upon in case all other power was lost. Emergency lights controlled by batteries have been installed every 250 feet in the tube.

The usual traffic light system of red, green and amber has been installed in the tunnel with some variations. The tunnel has two lanes of traffic and five lights have been placed in each. They are so arranged that in event of a crash in the tunnel all the lights ahead of the accident can be turned green to clear the tube of as much traffic as possible while all the lights in rear of the crash are turned red in order to avoid congestion in the tube.

These lights can be controlled from any one of the several police boxes lining the wall of the tube above an elevated walk or from the control room.

At the Mobile entrance of the tunnel two high standards have been erected. It is an electric eye which regulates the height of vehicle passing through the tunnel. Whenever a truck passes which hasn't the proper vertical clearance to safely drive through the tunnel, the electric eye immediately turns the traffic light in front of the machine red and will so remain until the truck is removed from the line of traffic.

A similar device was not installed on the Blakely Island side because toll collectors will be located at that point.

The hurricane steel doors which have been installed at the Blakely Island portal entrance are expected to take care of any wave action which might occur during hurricanes or storms. As an added precaution, the box section was also filled in and protected from any high water damage.

The panel board — sometimes called "brains" of the tunnel—is also located in the ventilation building. At this master switchboard an operator controls lights, pumps, ventilation, fire and police alarms as well as every phase of operation throughout the facility.

The hurricane doors are not electrically controlled and must be opened and shut by manual labor.

A. A. Coffin, city electrical engineer, said the most astonishing feature of the entire job was the "simplicity and fool-proofing of the electrical work."

Mr. Sauer, who supervised the work for the Miller Electric Company, also assisted in the installation of the approach lights for the Holland Tunnel, in New York, and on the Pulaski Sky-Way drive into New York.

The Bankhead Tunnel sponsored by the city of Mobile was financed by a $1,500,000 PWA grant and $2,500,000 loan from the RFC. The RFC purchased revenue anticipation bonds which will be retired in tolls collected from the facility.


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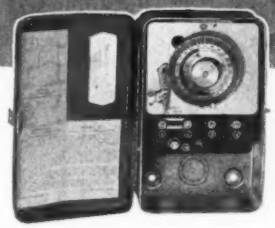

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